



User Manual of CG938H Wheel Loader

Sichuan Chengdu Chenggong Construction Machinery Co., Ltd.

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Preface

Thank you for purchasing our product!

Before you operate the product, please read this manual thoroughly to ensure your safety and better performance of the product.

This manual contains issues regarding safety protection, operation instruction, lubrication and maintenance.

This manual does not elaborate on the configuration, operation or maintenance issues of main purchased parts such as engine, torque converter, or transmission, etc. For the detailed information, please refer to the attached operation manual of the main purchased parts.

The details or attachments showed by pictures or diagrams in this manual may vary from the actual product. And, for convenience of elaboration, the cover plate or shield on the product may be removed.

This manual does not include the continuous betterment and improvement of the design of the product.

For questions regarding your machine or this manual, please contact Chengdu Chenggong Construction Machinery Co., Ltd., Sichuan for the latest information.

You are welcome to bring forth advices on the errors or defects of this manual and we will revise accordingly in new editions.

This manual does not cover tool-carrier. Separate manual is attached when client purchases a tool-carrier.

Safety

The Safety section lists basic safety precaution measures and explains the contents of the warning labels on the machine. Please read and comprehend the basic safety precaution measures prior to operation, lubrication, maintenance or repair of this machine.

Operation

The Operation section is for the reference of new operators and for review of experienced operators; it shall be kept handy for reading and learning.

The pictures or explanations are intended for operators getting familiar with the appropriate procedures of check, start, operation and stop of the machine.

This manual explains the basic operation techniques. The operation skills and techniques of

the operators will improve as the knowledge of the operations on the machine and its performance accumulates.

Maintenance

The Maintenance section contains instructive contents on the maintenance of the machine. The maintenance issues whose periods are not specified are listed in the item of “in need”. For the issues included in the “maintenance period”, please refer to the following elaborations.

Maintenance period

The maintenance period shall be calculated according to timer meter. If more convenient maintenance plan can be provided by the calendar date intervals (days, weeks, or months, etc.) and the intervals of this plan is close to the reading of time meter, it can be used to replace the time meter to calculate maintenance period. The recommended maintenance shall be implemented by the interval whichever is due earlier.

Under the work condition which is extremely severe, dusty or humid, more lubrication maintenance may be needed than that specified in the “maintenance period”.

All maintenance items shall be conducted repeatedly in the maintenance period. For example, when conducting a maintenance item of a interval of each 500 work hours or each quarter, the maintenance items listed in the intervals of each 250 hours or each month, each fifty hours or each week, and each 10 work hours or everyday shall be conducted simultaneously.

Important safety contents

Most of the accidents result from ignorance of basic safety rules or maintenance measures. Pay attention to potential accident threats. The relevant staff shall pay attention to potential accident threats and possess certain skills by training to correct malfunctions.

Inappropriate operation, lubrication, maintenance or repair is hazard and may result in casualty of personnel.

Any operation, lubrication, maintenance or repair shall not be conducted until the contents regarding operation, lubrication, maintenance and repair are read and comprehended.

Safety precaution issues and warnings are listed in the manual. Ignorance of these warnings may result in casualty of relevant personnel.

It is impossible for Chengdu Chenggong Construction Machinery Co., Ltd., Sichuan to predict every kind of work environment where peril is present. Therefore, the warnings in this manual can by no means cover every aspect. If a certain tool, program, work method or operation technique is not recommended by Chengdu Chenggong Construction Machinery Co., Ltd., Sichuan, you shall take care as for the safety of yourself or of other people. You shall ensure that the operation, lubrication, maintenance or repair procedures you elect will not cause the damage or unsafe status of the machine.

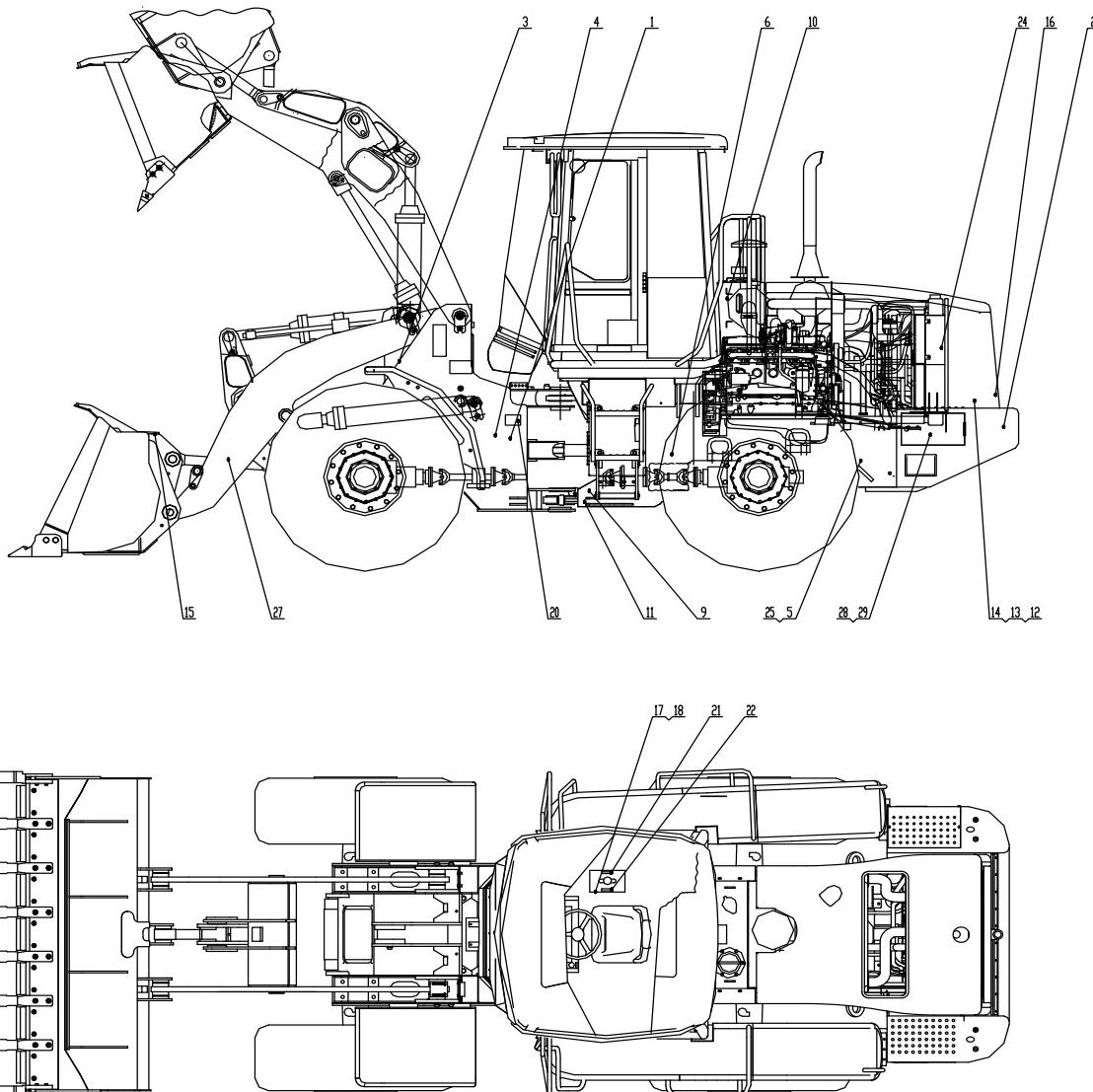
The contents, norms and diagrams in this manual are based on the data which are available at the time when this brochure is compiled. The norms, torque, measurement and modulation methods, diagram and other contents are subject to modification at any time and these modifications may affect the maintenance and repair of the machine. Complete and latest data shall be obtained prior to the start of work. Chengdu Chenggong Construction Machinery Co., Ltd. will provide the latest data.

I Safety symbols

1.1 Safety Symbols and Their Positions

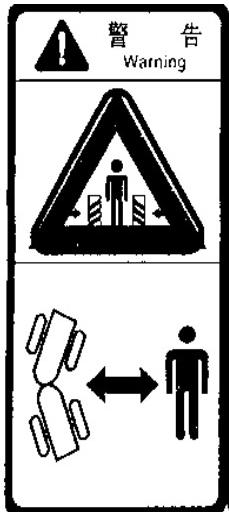
There are a number of safety symbols on this machine. In this section, their exact positions are identified and the hazard of accidents is described. Please get familiar with all these safety symbols.

Pay attention to all safety symbols and their positions and implications. The symbols and warnings that are obscure or damaged during use shall be replaced by new ones. Clean the safety symbols with cloth, water and soap. Do not use solutions, gasoline or stringent chemical agents that may result in loss of adhesiveness and peel-off of the symbols.



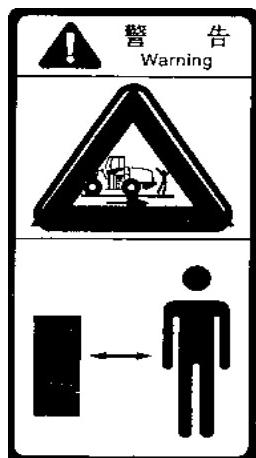
1.2 Implications of Safety Symbols

1. Keep distance (at the jointing of the chassis frames)



During the operation of the machine, it is prohibited to approach the jointing of the chassis to avoid accident or casualty!

2. Keep distance from the machine loader (At the counter weight of the loader)



During the operation of the machine, it is prohibited to approach the machine or enter into the work area to avoid accident or casualty!

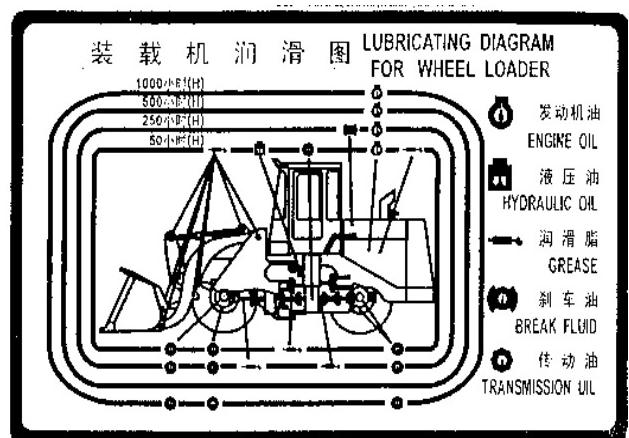
3. No staying under the working device (underneath lift arm)



During the operation of the machine, it is prohibited to get underneath the Machine!

When the machine is stopped and the movable arm is lifted, it is prohibited to get underneath the machine! To avoid accident or casualty!

4. Lubricating diagram for wheel loader



Please conduct lubrication maintenance for the machine in compliance with the requirements.

5. Symbol of crane hook



When the machine needs to be hoisted, please hang the hook or rope at the location where the hook symbol is affixed.

6. Notice on oil-filling of torque



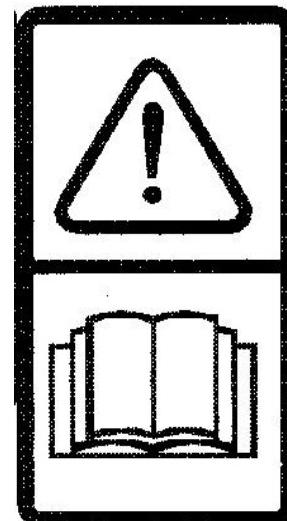
7. FOPS and ROPS cautions

(at side door of the cab)



The cab has a rollover And falling object protective structure which shall not be modified.

8. Sign for reading specification (at side dor of the cab)



Prior to operation or maintenance, please read and comprehend operation and maintenance instruction and safety issues

9. Instruction on safety stand for oil cylinder (on the machine body)



The safety stand for oil cylinder is a safety device and is hanged at the rear frame. Before servicing, take it off and lock it in piston of oil cylinder and installed at the surrounding of the piston rod of the oil cylinder.

Notice: when installing and using the device, please keep the bucket empty and the loader at non-operating state.

10. Tank sign (on the machine body)



11. Symbol of lock rod (on the machine body)



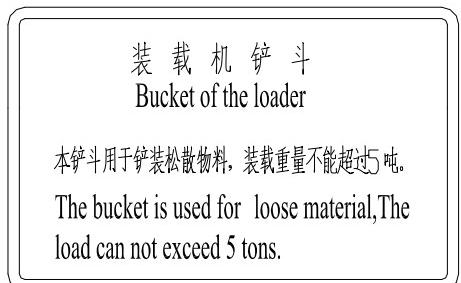
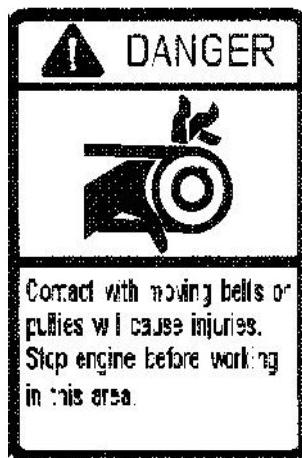
When the machine is hoisted and loaded on other machines, or when servicing at the middle of the machine, the lock rod shall be installed between the front and rear frames to keep the machine in a straight position. When the machine is hoisted and loaded on other machines, or when servicing at the middle of the machine, the lock rod shall be installed between the front and rear frames to keep the machine in a straight position.

12. Do not approach fan when engine is working (On the housing)



Contact with fan will cause injury.
Keep hands away from fan area.

13. Keep away from moving belt (on the machine body) 15. Plate on the bucket of the loader



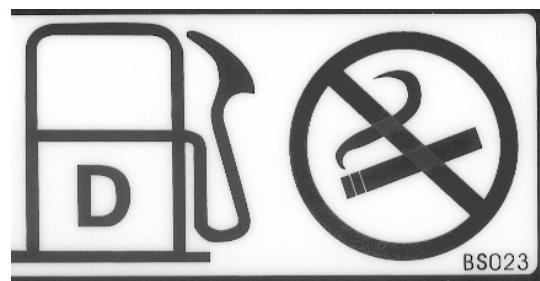
Contact with moving belts or pulleys will cause injuries. Keep hands away from the belt. Stop engine before working or maintenance in this area.

**14. Caution: Spray of pressured liquid
(on the machine body)**

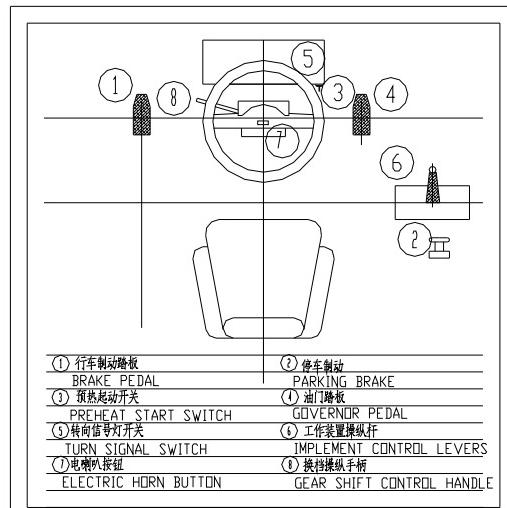


Pressured liquid (diesel, engine oil, coolant) may cause injuries. Allow system to vent pressure slowly before servicing.

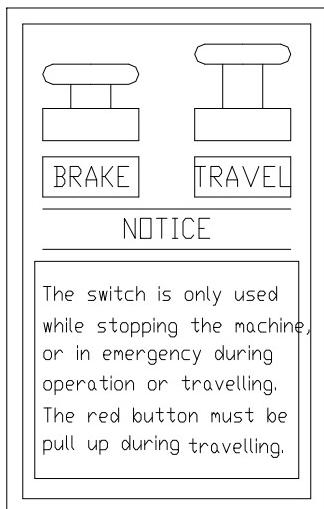
16. Plate on fuel tank



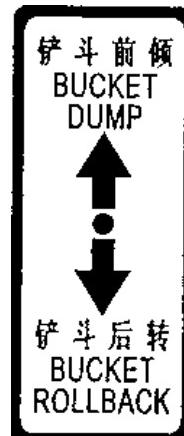
17. Operation plate of cab



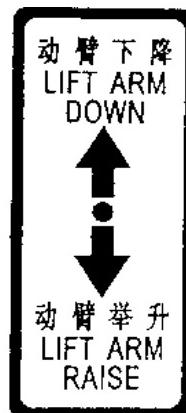
18. Stop notice plate



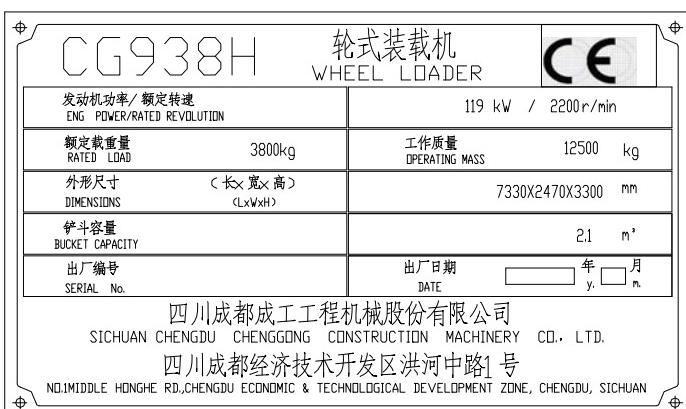
21. Bucket forerake and rollback



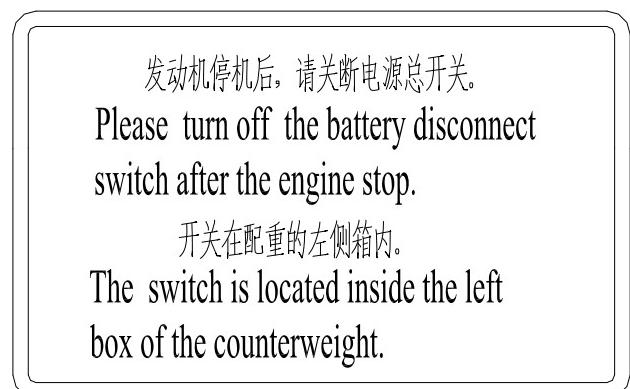
22. Rise and down of lift arm



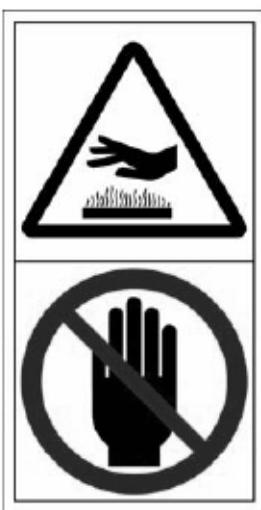
20. Product nameplate (on left side of the fore frame)



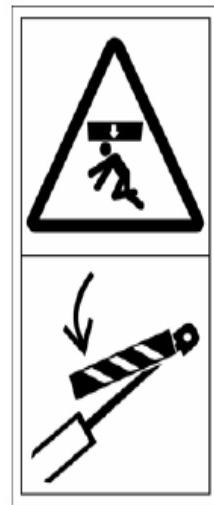
23. Powr off prompt sign



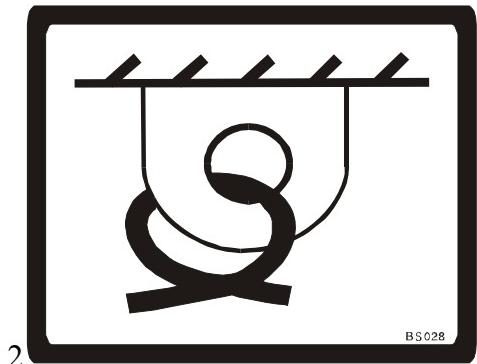
24. Burn prevention symbol



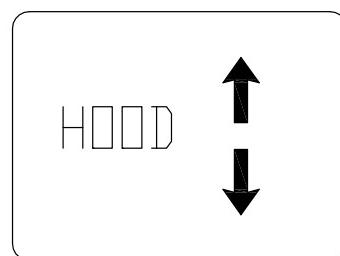
27. Symbol of lift arm support



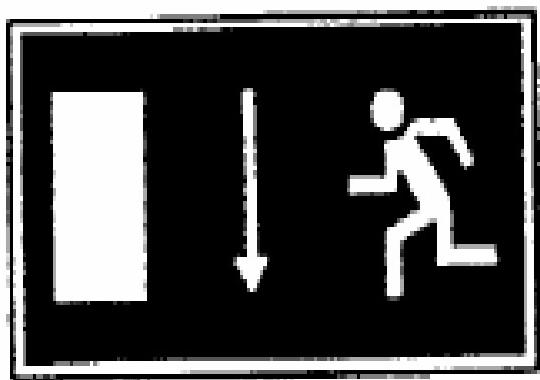
25. Binding symbol



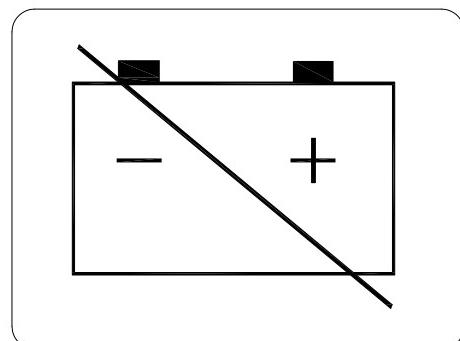
28. Housing rollover switch symbol



26. Symbol of escape exit from the cab



29. Master switch symbol



II Safety rules

2.1 EU Safety Requirements

1. Noise limit requirement

Complying with the 2000/14/EC directive, this machine meets the following requirements:

L_{PA} : $\leq 85\text{dB(A)}$

L_{WA} : $\leq 105 \text{ dB(A)}$

2. The vibration value of the seat of cab of this machine meets the requirements of ISO 7096-2000.

3. Electromagnetic compatibility

The electromagnetic compatibility of this machine complies with the relevant requirements of ISO13766 Standard. The machines can maintain its normal functions in certain electromagnetic environments and the electromagnetism generated during the operation does not cause damages to surrounding environment.

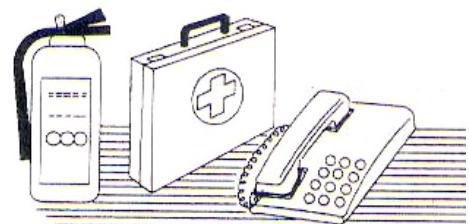
4. The cab of this machine has ROPS – rollover protective structure and FOPS – falling object protective structure.

2.2 Safety of Operator

Pay attention to location of all safety and warning symbols on the machine and comprehend their meanings. The symbols and warnings that are obscure or damaged during use shall be replaced by new ones.

When the operator is in one of the following status, he shall not operate the machine:

- When the operator is exhausted, he shall not operate the machine.
- When the operator has taken medicines that may cause sleepiness, he shall not operate the machine.
- The operator shall not operate the machine after drinking alcohol.
- The operator shall wear work clothes, work cap and work gloves for the servicing of the machine. The operator shall not wear clothes or ornamental articles that may either hook or entangle the machine, or cause combustion or sparkles in contact with electrical devices.



- Personnel who is not approved or certificated (operation qualification certificate) is not allowed to conduct operation, repair, or maintenance of the machine.
- Be familiar with the command signs and only follow the command signs of one person.
- Before starting the machine, be clear of:
 - Location of fire extinguisher
 - Location of toolkit
 - Fire alarm telephone number
 - Emergency telephone number

Walk around the machine to ensure nobody is working around the machine and nobody is working lying underneath the machine.

2.3 Safety Protective Appliances

- When servicing the machine, determine the needed individual protective appliances according to the specific work environment.
- Do not wear clothes or ornamental articles that may either hook or entangle the machine.
- Do not wear clothes or ornamental articles that may cause combustion or sparkles in contact with electrical devices.
- All protective appliances shall be checked prior to use for their usability.



2.4 Safety Device

Ensure that all protective devices and housing are in their proper position. Any damaged one shall be repaired in time.

- Properly use the safety device;
- Do not dismantle the safety device and keep it under good conditions.
- Improper use of the safety device will possibly cause personnel casualty.

III Operation of the machine

Safety issues

In this section, relevant safety warnings and some accident threats are explained. Please assign some time to get familiar with these safety issues before starting the machine.

Warning contents

Warning

Unless you have already read and comprehended the servicing instructions and safety issues, do not work on this machine. Failure to follow the instructions or ignorance of warnings may cause injuries. Be prudent is your responsibility.

Warning

This cab is integrated with the ROPS. Structural damages, rollover, modifications, replacements or improper repair may detrimentally affect the protective performance of ROPS and thus fail the standard that has been met previously. Please consult Sichuan Chengdu Chenggong Construction Machinery Co., Ltd for the limit of failure of the ROPS.

Warning

Improper external power supply may cause explosion and injuries. Tandem storage battery shall be contained in a separate storage battery box. When using an external power supply, the (+) pole of the wire shall be connected to the positive (+) pole of the storage battery that connects the starter coil, and the negative (-) pole of the wire of external power supply shall be connected to the negative pole of the starter. (If there is no negative pole of starter, connect to the body of engine.)

Warning

During the operation of the machine, the space between the front and rear frames is not allowed to be entered. When the machine is hoisted and loaded on other machines, or when servicing at the middle of the machine, the lock rod shall be installed between the front and rear frames to keep the machine in a straight position. When the machine is hoisted and loaded on other machines, or when servicing at the middle of the machine, the lock rod shall be installed between the front and rear frames to keep the machine in a straight position.

Warning

When servicing hydraulic parts inside the front frame or front axle and the movable arm is needed to be lifted, the bucket shall be located on a solid platform to prevent it from falling and cause severe injuries.

Warning

During the operation, repair, lubrication, maintenance and operation of this machine, only one person with operation certificate is allowed to operate machine or conduct servicing of repair, lubrication, maintenance, etc. Other people shall stay away from the machine. When operating the machine, it is prohibited to have more than one person in the cab.

Common hidden troubles

Before maintaining or repairing the machine, please hang “please do not operate” or similar warning label on the engine start switch or hydraulic operation handle.

When maintaining or repairing the machine, shall wear hard cap, protective goggles and other articles called for by the work environment.

When operating or maintaining the machine, shall not wear loose clothes or jewels, otherwise may get entangled on the control lever or other parts of the machine.

Ensure all guard plates and cover plates are fixed on the machine.

Ensure there is no fragment, oil stain, tool or other irrelevant miscellaneous matters on the machine, particularly on the console panel, passage or stairs.

Put the miscellaneous articles in order, such as dinner pail, tools and other miscellaneous articles irrelevant to the machine.

Be clear of the hand-and-arm signals at site and who give signals. Only receive signals from one person.

Never contain maintenance solution in glass container.

Be careful when using cleaning agents.

Report all items needing repair.

Unapproved personnel are not all allowed to be on the machine.

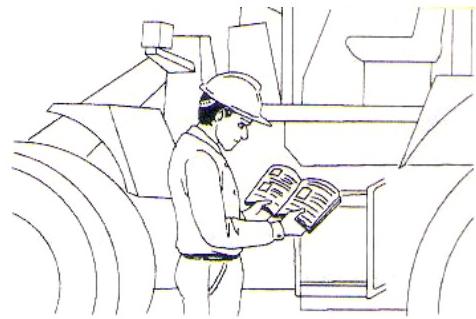
Maintenance shall be conducted in accordance with the following requirements (except for otherwise specified):

- Park the machine on horizontal ground
- Shift the shifting handle to neutral position.

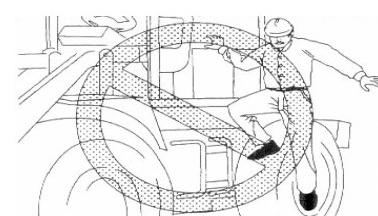
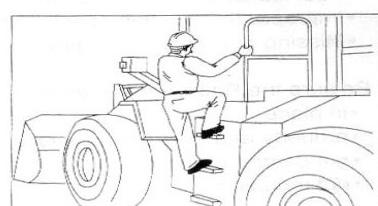
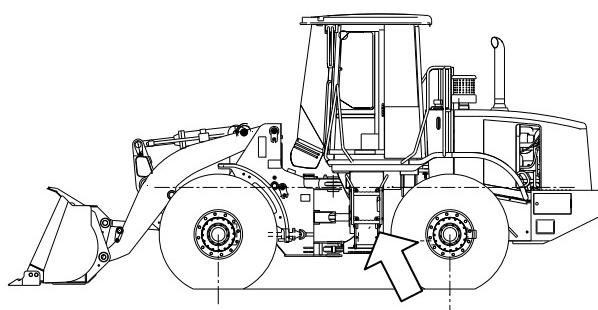
- Shift the hydraulic control lever to maintaining position
- Stop engine
- Press the parking switch button
- Turn the preheat start switch to “0” position and take off the key
Turn off the master switch

3.1 Get Familiar With the Machine

- Only those personnel who have received training and obtained qualification are allowed operate and maintain the machine.
- Read and comprehend operation and maintenance instructions and safety issues, otherwise do not work on the machine.
- Failure to follow the instructions or ignorance of warnings may cause injuries.
- When there is oil or grease at or near the operation position, please remove it. Otherwise there will be peril of slip.
- During the operation, repair, lubrication, maintenance and operation of this machine, only one person with operation certificate is allowed to operate machine or conduct servicing of repair, lubrication, maintenance, etc. Other people shall stay away from the machine. When operating the machine, it is prohibited to have more than one person in the cab.
- Various checks on the machine shall be conducted prior to operation. Check whether all the safety protective devices are in a safe status; whether the tires are worn and whether the tire pressure is proper. Check whether there is abnormal phenomenon of oil leakage, water leakage, gas leakage, deformation, looseness, abnormal sound, etc., which may cause malfunction or severe accident.



3.2 Get in and off the Machine



- Climb up and down the machine only at places where there is a ladder or steps.
- When getting in or off the machine, do not wear loose clothes such as headscarf or jewels, otherwise they may be clamped and injuries may be caused.
- Check the handrails and steps before getting in and off the machine; remove oil stains, lubricants or mud if there is any. Besides, damages of parts shall be repaired and loose bolts shall be fastened.
- It is prohibited to jump onto or off the machine.
- It is prohibited to get in or off the machine when the machine is moving.
- When getting in or off the machine, face the machine, hold the handrail and step on the steps; keep three-point contact (two feet and one hand or two hands and one foot) to ensure the stability of the body.
- It is prohibited to hold any control lever when getting in or off the machine.
- It is not allowed to climb into the cab from the rear ladder of the machine or get off the machine by the tires beside the cab.
- Do not climb up or down the machine when carrying tools or other articles; the needed tools shall be hoisted onto the operation platform by rope.



3.3 Fire and Explosion Prevention

The fuel used by the engine of the loader, most lubricant and some coolant are combustibles. It is very dangerous when flame is close by and special care shall be taken.

- Do not leak the fuel on hot surface or electric components; otherwise may cause fire.
- When fill fuel, the engine must be stopped. Do not smoke when filling fuel or at the fuel-filling area.

Explosive gas will be generated around the storage battery; keep flames away. Maintain and use storage battery in strict compliance with the instructions in the product manual. Do not smoke at places where storage battery is being charged or where combustibles are stored.

- Fasten the lids of containers in which the above stated combustible liquid is stored.
- Put the combustible liquid in protective containers and keep them at safe place. They shall be stored by categories and marked accordingly. Prevent them from being used by non-staff people.

- Put oily cloth and other combustibles in protective containers and keep them at safe place.
- Remove combustibles accumulated on the machine, such as fuel, lubricant and other fragments.
- Do not conduct welding or flame cutting operation on tubes or boxes containing combustible liquid. Before welding or cutting, must clean with fire-resistant fluid when these operations have to be done.
- During the operation of the machine, when the exhaust outlet of the engine muffler is close to dry grass, waste paper or other combustibles, special care shall be taken. Do not place the machine at places with flames or burning bushes when it is practical.
- When parking the machine, take care to select parking place and avoid the high temperature parts like the engine muffler close to combustibles.
- Clean and fasten all electrode terminals. Check for loose or worn wires everyday. Before starting the machine, fasten loose wires and repair or replace worn wires.
- Check whether there is a leakage of fuel, engine oil or hydraulic oil. When there is, change the damaged hose; complete the repair and cleaning before operation.
- Do not use flames when checking dark areas.
- Shall prepare a fire extinguisher and know how to use it. Inspect and maintain it according to the instruction in the manual.

3.4 Fire Extinguisher

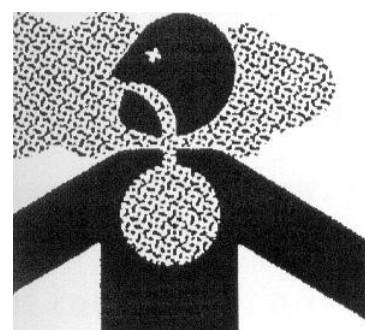
Take actions immediately should a fire arise:

- Must prepare a fire extinguisher for use; get familiar with operation of the fire extinguisher.
- Must prepare first-aid kit at the site. Check regularly and replenish medicines when necessary.
- Sort out some emergency telephone numbers (such as first-aid center, hospital, fire alarm) for contact in emergency. Post these numbers at specified places to ensure everyone is informed.

Location of the fire extinguisher:

3.5 Ether (when coldstart device is equipped on the machine)

- Ether is a toxic and combustible object.
- Injury will be resulted from inhalation of ether vapor or frequent skin contact with ether.
- The area shall be well-ventilated where ether is used.



- Do not smoke when changing ether container.
- Take care to prevent fire when using ether.
- Do not put replaced ether container at living area or in the cab.
- Do not put ether at places under direct sunshine or where the temperature is over 39°C (120°F).
- Put discarded ether container at safe place. Do not perforate it or heat it.
- Keep ether container at place which is not accessible for non-staff.

3.6 Precautions for Burnings and Other Injuries

Coolant

- When the machine is working or has just finished working, the engine coolant is hot and is pressured. All the tubes from radiator to engine contain hot water or steam; severe burnings will be inflicted by contacting with them.
- When checking the coolant level, the engine shall be at the status of stopping and screw off slowly the filler cap of cooling system to check the fluid level (screw off slowly to vent the pressure).
- When it is needed to discharge the coolant, allow the coolant cool down completely before the discharge.

Oil

- Hot oil or hot parts may cause injuries. Please take care not to touch hot oil or parts to avoid skin burning.
- When the machine is working or has just finished working, the hydraulic oil's temperature is high and the oil is pressured.
- When opening the filler cap of hydraulic oil tank, the engine shall be stopped and screw off slowly the filler cap (screw off slowly to vent the pressure).
- Before opening the hydraulic oil tank cover, any tube or joint or dissembling parts, please vent their pressure firstly.
- Please do not knock or bend high-pressure tubes.

Accumulator

- Must inspect accumulator before filling nitrogen. It is prohibited to fill gas in if the accumulator is not installed with plate, the contents on the plate is not complete or not able to be recognized, or defects on the body which may affect safe use of it.
- The accumulator is only allowed to fill in nitrogen. It is prohibited to fill in oxygen, compressed

air or other combustible gas to avoid explosion.

- The accumulator is a high-pressure container and shall be maintained or changed by professional manufacturers. Before dissembling the accumulator, pressure must be vented and nitrogen inside the bladder be discharged with special tools. Then the parts can be dissembled.

Storage battery

- Storage battery will release combustible smoke that may cause explosion.
- Do not smoke when checking the electrolyte of the storage battery.
- Electrolyte is an acid material that will cause injury when in contact with skin or eyes.
- Wear protective goggles when working on storage battery.

Pipeline, tubes and hoses

- Do not bend or hammer high-pressure pipelines; do not install damaged tubes or hoses on the machine.
- When repairing any loose or damaged fuel or lubricant tube or hose, any leakage may cause a fire. Please take care to ensure safety.
- Inspect the pipelines, tubes and hoses. Do not check for leakage with bare hand. Check for leakage with a piece of board or cardboard. Fasten all joints with specified torque. When any of the following troubles is discovered, shall make replacement.
 1. Damage or leakage of joints.
 2. Wear-out of or cut on outer layer and bareness of reinforcing wire.
 3. Local bump of outer layer.
 4. Obvious twist or flatness of hoses.
 5. Wire in reinforcing layer is embedded into outer layer.
 6. Displacement of end joints.

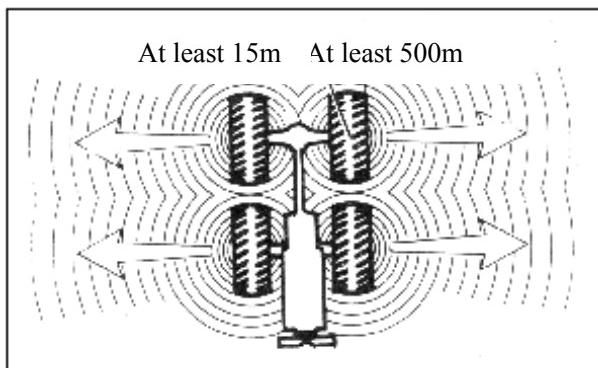
Ensure correct installation of all pipe clamps and guard plates to avoid vibration and consequent overheating by friction with other parts when the machine is working.

Tire

Explosion of tire full of gas results from heating and combustion of the gas inside the tire. Heating is usually caused by welding or heating of wheel rim or flames. Or it may be caused by gas combustion resulting from overuse of brakes.

Explosion of tyre is much powerful than deflation. Explosion may cause tyre and wheel rim to fly away as far as 500 meters. Explosion and its fragments may result in injuries and property damages.

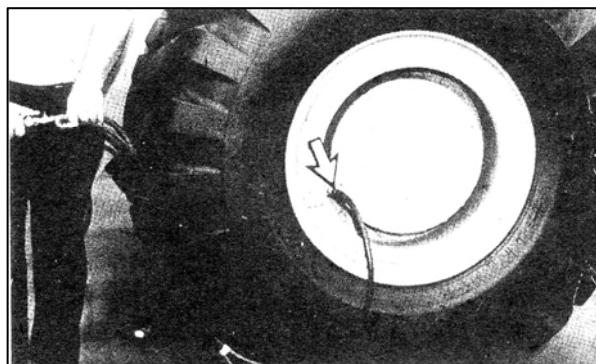
Do not stay in the range indicated in the following diagram.



Recommend inflate tyres with dry nitrogen (N₂). If there is already air inflated in the tyres, recommend use nitrogen to adjust pressure. Nitrogen can be blended with atmosphere air.

Tires inflated with nitrogen are less probable to explode, because nitrogen is not combustible. Besides, nitrogen helps prevent ageing of rubber and corrosion of wheel rim parts.

Proper equipment and training is desirable to avoid overinflation. Leakage or damage of wheel rim are caused by improper inflating equipment or improper use of it.



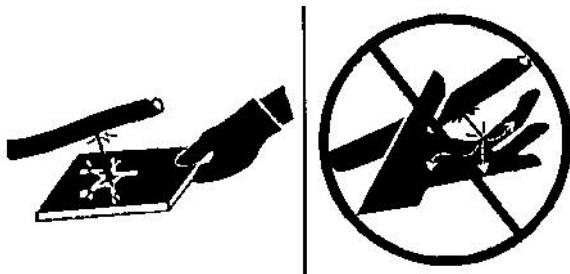
Compressed air

- Compressed air may cause injuries. When clean with compressed air, wear mask, protective clothing and shoes.
- The maximum pressure of compressed air used for cleaning shall be lower than 0.205Mpa.

Leakage of solution

Use board or cardboard to check for leakage.

Even the leakage of pressurized fluid as minor as a needle eye may penetrate muscles and cause injuries. If solution is jetted to skin, it shall be treated within a couple of hours by surgeons who are familiar with this kind of injury.

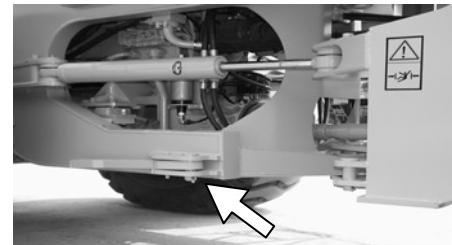
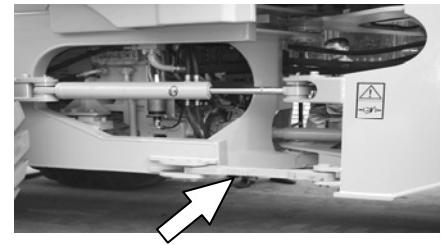


Asbestos

When handling parts that contain asbestos fiber, it shall be avoided to inhale in asbestos dust, which is harmful. The products of Chenggong that contain asbestos are brake pad, brake plate and some gaskets, the asbestos inside which are normally sealed with colophony or by other means. As long as no air containing asbestos is generated, normal handling is harmless.

When asbestos dust is generated, follow the precautions below:

- Never clean with compressed air.
- Do not brush or abrade materials containing asbestos.
- For better cleaning result, clean with wet cloth or vacuum equipment with high efficiency dust/air separation filter screen.
- Ventilate machining workstation of frequent use.
- Wear proper breathing mask when there is no way to control asbestos dust.
- Observe applicable laws and regulations in the work area.
- Store asbestos in compliance with relevant environment laws and regulations.



3.7 Precautions for Crush or Cutting

- During the operation of the machine, the space between the front and rear frames is not allowed to be entered.

When the machine is hoisted and loaded on other machines, or when servicing at the middle of the machine, the lock rod shall be installed between the front and rear frames to keep the machine in a straight position. When the machine is hoisted and loaded on other machines, or when servicing at the middle of the machine, the lock rod shall be installed between the front and rear frames to keep the machine in a straight position.

Lock rod

Lock rod is painted with red warning color. When it is in a lock status, it can prevent perilous factors caused by relative movement of articulated front and rear frames in case of being under unpredictable foreign force. When the lock rod is in a lock status, the machine cannot run.

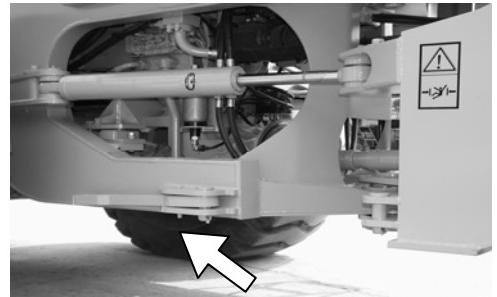
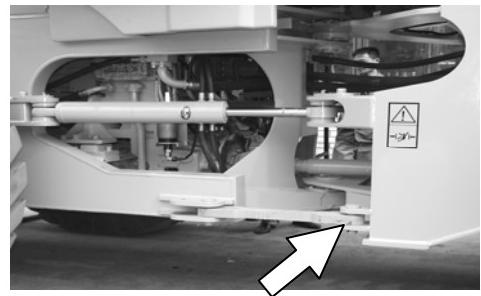
The lock rod must be in a lock status in following circumstances:

- During inspection, maintenance and repair of the machine;

- When preparing to leave after finishing the work and stopping the engine each time;
- When the machine is being hoisted;
- During shipment of the machine;

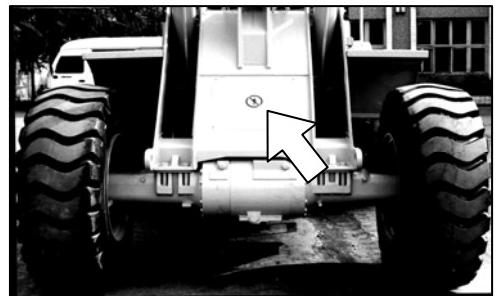
Fix

1. Keep the front and rear frames in a straight position.
2. Take off the rear split pin at the rear lug with a wrench, then take off the pin shaft from the upper side.
3. Rotate lock rod onward until the hole in the lock rod is concentric with the hole at front lug (see the picture).
4. Insert locking pin shaft from the upper side and fix it with split pin. The front and rear frames are now in a lock status.



Release

1. Take off the split pin at the front lug, then take off the pin shaft from the upper side.
2. Rotate lock rod backward until the hole in the lock rod is concentric with the hole at rear lug (see the picture).
3. Insert the pin shaft which was taken off from the upper side and fix with the split pin. The front and rear frames are now in a free status.



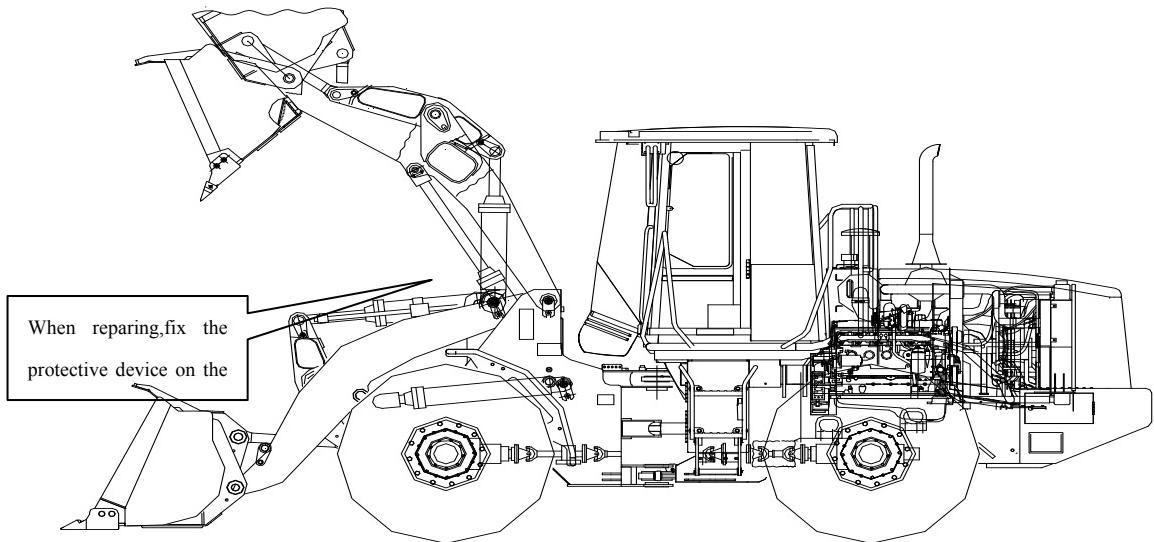
- **When servicing hydraulic parts inside the front frame or front axle and the movable arm is needed to be lifted, the bucket shall be located on a solid platform to prevent it from falling and cause severe injuries. It is prohibited to have anyone stand underneath the bucket or movable arm when the machine is working.**

When working underneath the machine, the machine and its attachments shall be properly supported. Do not rely on hydraulic device to keep the stability of the machine. If the control mechanism moves or hydraulic pipeline leaks, any attachment may fall off.

Instructions on use of protective safety stand for lift cylinder

Protective safety stand for lift cylinder is a safety protective device. It is fixed at the rear frame. Before servicing the wheel loader, it shall be removed from the fixing position and installed at the indicated places of the lift cylinder (as shown in the diagram). The orders of the removal and installation is as follows:

1. Remove the protective device;
2. Install it at the specified positions of the lift cylinder (two places at the left and right side of the oil cylinder);



When not repairing, fix the protective device for the oil cylinder at the left side of the rear frame.

3. Install and fasten tightly its fixing bolt.
- Unless otherwise specified, no adjustment shall be made when the machine is working or the engine is running.
 - At the linkage mechanism of the work device, in accordance with the movement of the work device, the space at the linkage mechanism may increase or decrease.
 - Keep away from all rotating and moving parts.
 - Ensure that there is no any foreign matter between the fan blades. Fan blades will throw out or cut the tools or other foreign matters which fall inside or are pushed inside.
 - Do not use twisted or worn wires or cables. Wear gloves when handling wires and cables.
 - When removing bouncy objects, such as snap ring or closing ring, wear protective goggles to protect eyes. Take care to check whether anyone is nearby in case injury being inflicted to other people.
 - When disassembling parts by hammering, fragments may fly over. Take care not to cause injuries.

3.8 Precautions in Using FOPS & ROPS (falling object protection structure or rollover protection structure)

The rollover protection structure (ROPS) and falling object protection structure (FOPS) of the

wheel loaders of Chengdu Construction Machinery Co. Ltd are integrated with the cab. The FOPS & ROPS are for protection of operator in case of heavy objects falling down from above or rollover of the machine. The ROPS will not only bear the load when the machine is rolling over, but also absorb impact energy.

- If the device is damaged by falling or rollover, its strength will decrease and it will be unable to perform its protective functions. For this instance, please contact with Chengdu Construction Machinery Co. Ltd or its approved dealers to consult for repair method.
- Even if the POPS is installed, the operators must fasten safety belt for effective protection. Even if no defect is discovered of the safety belt, it shall be replaced every three years.
- It is prohibited to bore or weld inside or outside of ROPS, otherwise the strength of ROPS may be lowered. The protective performance of FOPS & ROPS will be weakened if the cab is damaged or turnover occurs.

3.9 Proper Handling of Waste

In order to prevent pollution, especially in the places where people or animal abide, the following requirements must be observed:

- Use leakage proof container when discharging liquid. It is not allowed to dump waste liquid on ground, sewage or water source site.
- When handling harmful materials, such as lubricant, fuel, coolant, solution, filter, storage battery and other materials, observe the relevant laws and regulations.
- The replaced waste tires shall be stored in specified safe place or be recycled. Do not dispose of randomly.

3.10 Prevention of lightning injuries

When lightning occurs near the machine, the operator is prohibited to carry out following procedures:

- Climb up the machine.
- Get off the machine.

If you are in the cab when lightning occurs, please remain in the cabin. If you stand on ground when it occurs, you should stand at a place far from the machine during the lightning period.

IV Start of machine

4.1 Investigate Surroundings before Working on the Machine

- Before starting operation, get familiar with the surroundings; check carefully and identify abnormal situations that may arise.
- Investigate the topography and ground status of the site and decide on the best and safest operation method.
- When working indoors or in other enclosed places, make sure the site is well ventilated to avoid poisoning by waste gas.
- In places where embedded facilities exist, such as water pipe, gas pipe, or high voltage cable, contact with relevant companies to identify the location of embedded facilities. Take care not to damage these facilities during construction. Ensure the safety of construction.
- Remove the obstacles on the drive path. Pay attention to perilous objects of wires, trenches, etc.

4.2 Inspection on the Machine before Starting it

- Check whether there is leakage of oil, leakage of water, looseness of bolt, abnormal sound, or damage or loss of parts.
- Confirm whether the lock rod of the front and rear frames has been released.
- Check whether the fluid level of coolant, fuel and the oil in the oil sump is at a normal status; check whether the air filter is blocked.
- Check whether all the lighting and signal lamps work properly.
- Check whether the meters and horn work properly; check to ensure the control lever or control button is at parking position.
- Remove dirties on the glass of cab and all the lamps to ensure good visibility. The doors and windows shall be fixed in the status of open or close.
- Adjust the rearview mirror to proper position to ensure good visual field of the operator.
- Adjust the operator's seat to best operation position; check whether the seat safety belt and fixture device of it are damaged.
- Check whether the condition of fire extinguisher is normal.
- Ensure the safety belt is properly fastened.

4.3 Before Starting the Engine

- Take care to check if the lock rod of the front and rear frames is removed and fixed upon the rear frame. Do not start machine when the lock rod is not removed.

- Only starting the engine in the cab is allowed. It is prohibited to start engine by short-circuit terminals of motor or storage battery. Starting by bypass system will cause damage of electric system.
- Adjust the seat so that the driver can step down the pedal to its full range while sitting against the seat back.
- Check whether the lighting system of the machine works properly.
- Before starting the engine and the machine, check whether there is anyone working upon, underneath or near the machine. Check whether there is anyone in the work area.

4.4 Starting of Engine

- When the “please do not operate” or similar label is hanged on the starting switch of control lever, do not start engine or operate any control lever.



- Turn on the master switch in the left box of the counter weight.
- Place the hydraulic control lever at “middle position” before starting engine.
- Place the shifting handle of the transmission case at “neutral position”.
- Engage parking brake.
- Blow horn to attract attention of people nearby.
- Insert key and turn it clockwise, and turn on preheat start switch. Then turn the key to start engine.
- **The starting of engine shall not be longer than 5 seconds. Allow the starting motor cool down for 2 minutes before starting again. In case the engine fails to be started for three times continuously, do not start the engine again to find out the causes and solve the problems.**
- Start and work on engine in well ventilated condition. Discharge waste gas in enclosed places.

4.5 After Starting of Engine

- Keep low-speed run of engine until the engine oil pressure gauge indicates the pressure is normal. If there is no engine oil pressure within 10 seconds, turn off the engine. Make an investigation before turning on engine again; otherwise the engine may be damaged.
- Allow at least 5 minutes for low speed racing to let the engine warm up. Operate all control levers to accelerate preheating of hydraulic parts.
- Pay attention to check whether the meters are in the normal range during the operation.
- When the engine is racing for preheating, observe the following instructions:
 - When the ambient temperature is above zero, the preheating time is approximately 15 minutes.
 - When the ambient temperature is below zero, the preheating time is approximately 30 minutes.
 - When the ambient temperature is below -18°C , the preheating time shall be longer.

4.6 Check after Starting of Machine

After staring the machine and before operating it, the following checks shall be conducted to ensure there is no safety threat.

- Check whether there is an abnormal sound and successive vibration when the engine is running. If there is, it implies possible malfunction of the machine. Report to supervisors and repair before operating.
- Check the speed control of engine at neutral position.
- Check meters, apparatus and alarm lights to ensure that they work properly and within the specified range.
- Manipulate all control levers to ensure their smooth movement.
- Operate the shifting handle to ensure the accuracy of drive, neutral and backward shifts of the machine.
- Check whether the brake pedal and governor pedal work properly according to the user manual. Check whether the left and right turning are smooth at low speed.
- Ensure back-up buzzer work properly.
- Ensure hand brake is released before driving the machine.

4.7 Before Operating Machine

Ask people near the machine to leave.

Drive machine slowly to open land and check whether all control levers work properly.

4.8 Machine Operation

- Drive the machine while sitting.
- Before driving machine, the driver shall make certain that nobody would be injured.
- Drive the machine slowly to open land and check whether all control levers work properly.
- Only operate control levers when the engine is working.
- It is not allowed to carry people when the machine is working.
- Report the items needed to be repaired that are discovered during operation.
- The bucket and other work devices shall approach ground as close as possible, about 40cm from the ground.
- Stop the machine in places far from cliffs, suspensions or slopes.
- If the machine side-slips down slope, unload the load immediately and drive the machine down the slope.
- Try to work in the up and down direction of slope and avoid working sideway to the slope.
- Keep the machine in a status under control. Do not overload.
- Keep the articulating and drafting devices are in a good condition.
- Trailer can only be connected to a drafting pin.
- It is prohibited to stride on traction rope or similar devices.
- When on hills, hardpan or slopes, or when crossing trenches, hillocks or other obstacles, pay attention to inclining of the machine.
- Report the items needed to be repaired that are discovered during operation.
- When linking trailer to the machine, it is prohibited to stand between the machine and the trailer. The traction frame or traction pin of traction equipment shall link to the traction pin of the machine.
- Get to know the maximum size of the machine, and the maximum work limit and range of the machine.

4.9 Stop Engine

- After completing loaded operation of the machine, do not stop engine immediately. Otherwise may cause overheating of engine and accelerate wearing of its parts. After parking the machine and engaging the brake, allow the engine continue to run 5 minutes before stop it, which well cool down slowly the overheated areas of the engine.
- Turn the key back to 0 position to stop the engine. Or not, the battery will be involved in flow backwards

- After parking in winter or at a cold place, if the cooling liquid is not be added with antifreeze, the water drain valve or water blocker on the engine body, radiator and intake etc. shall be opened to discharge the cooling water in order to prevent freezing.

4.10 Parking of Machine

- Park machine on horizontal ground. When it has to be parked on slopes, insert wedges under the machine.
- Step on parking pedal to stop the machine.
- Place the transmission control lever to neutral position.
- Press parking switch button and engage parking brake.
- After placing all work devices on the ground, place the work device control lever to “middle position”.
- **It is prohibited to stop engine by hydraulic system.**
- **Turn down the engine and take away the key.**
- **Turn off the master switch.**

V Safe drive

5.1 Sound Alarm (in compliance with ISO6746-1 Standard)

- Sound alarm that is controlled at the driver's position and reaches a minimum sound level of 93 dB (A) at 7m from the front end of machine.
- When the machine has troubles and is unable to continue to work or work at a low speed, turn on all turn lights (direction indicator lamp, brake lamp, alarm lamp) to give out warning to others.
- Pay attention to the meters and alarms.

5.2 Pay Attention to Drive Safety

- Please follow good operation practice in order to ensure the safety of yourself and others.
- Before starting vehicle, blow the horn to give out signal. Do not drive until it is confirmed that no people or obstacles around the vehicle.
- Do not stick body out of the vehicle.
- It is prohibited to use the bucket as a work platform or stand on it.
- Drive at the side of roads and take care to allow a passage for other vehicles to surpass. Keep distance.
- Try to avoid emergent brake operation.
- When driving at a high speed, it is highly risky to shift between forward and rear shifts. Try to avoid this operation.
- When driving or turning in narrow places, pay attention the surroundings and slow down to check whether there is any obstacle around.
- When the road condition is not good or the load is not stable, operate with care to prevent instability of the load.
- To ensure operation comfort of the driver and maximum life of transmission parts, slow down or brake before making gearshifts.
- When driving the machine, use parking brake to brake will cause severe wear of and damage to parking brake.

5.3 Full-load Transportation

- Do not transport with highly lifted bucket full of materials, which is hazard. When transporting with full-load, select proper speed and lower down the bucket to an appropriate height

(450-55mm from the ground) to lower the center of gravity and ensure stability of the vehicle.

- The weight of loaded materials shall not be heavier than the rated load weight of the machine; avoid overload. Chengdu Construction Machinery Co., Ltd is not liable to any machine damages or people injuries caused by overload.
- Avoid abrupt starting, abrupt stop or abrupt turning in transportation.

5.4 Overspeeding Is Prohibited

- Get familiar with the performance characteristics of the vehicle and decide on appropriate speed, route and operation method according to the specific conditions of the site. Keep the relevant operators being informed.
- When driving in busy traffic of downtown or crossing lofty places, keep at a low speed to ensure the vehicle is under control at any time.
- When driving on rugged or slippery roads, or on hills, avoid high speed driving, abrupt turning or abrupt stop.
- The engine shall work smoothly. Abrupt turning in high speed driving is prohibited.

5.5 Keep Good Visibility

- When visibility is not good in front, or at narrow crossings, slow down and hold on for a moment. Blow the horn to warn other vehicles or ask for guide by others when necessary; avoid imprudent operations.
- Dust, heavy fog and storm will affect visibility. Try to drive slowly when visibility is not good.
- Misjudgment on distance and height of ground is prone to occur in nights. Please drive at a speed suitable for the lighting condition.
- Turn on the headlights and roof lights when operating.

5.6 Notices for Driving in Adverse Conditions

- When operating and driving in adverse conditions, special care shall be taken to ensure safety. Do not work alone in hazard places. Investigate beforehand on the condition of drive path, strength of bridge, topography and geography of work site.
- When moving in wet or floppy places, avoid falling of wheels and take care to effects of brake.
- When operating in water or swamp, do not let the bottom of drive axle contact with water.
- The earth piled up on ground or near trenches is floppy. It may collapse under the weight of machine or by vibration of machine, resulting in rollover of the machine.

- Avoid approaching suspensions or deep trenches. The weight or vibration of machine may cause collapse of these places and result in rollover of machine and people injuries.
- When there is a danger of falling rocks or rollover, use protective devices (FOPS & ROPS).
- When working in rainy days, the operation environment may vary from that when it begins to rain and special care shall be taken. There will be deposit on the ground after earthquake or explosion occurs and special care shall be taken.
- When working on snow ground, the loading operation may change significantly according to the types of the snow. The load shall be reduced and take care to avoid slipping of machine on the ground.

5.7 Safe Drive on Slopes

- When driving on slopes, there is a danger of rollover of vehicle or sliding one side. Operate it with special care.
- When driving aside or changing directions on slopes, there is a danger of rollover of vehicle. Do not conduct this dangerous operation.
- When driving aside or changing directions on slopes, there is a danger of rollover of vehicle. Do not conduct this dangerous operation.
- Whenever it is practical, prefer to drive up or down slopes than on lanes or sidewalks.
- Select appropriate shift before driving down slopes. Never shift gears on driving down slopes.
- When driving on slopes, because the center of gravity of vehicle has shifted to the front wheels or rear wheels, operate with care and never brake abruptly.
- When driving on hills, banks or slopes, keep the bucket close to ground at a height of approximately 20~30cm (8—12inch). Lower the bucket down to ground in case of emergency to help stopping the vehicle or preventing rollover.
- When driving to slopes with full load:

Drive with the I shift.

Move forward when climbing up and backward when descending.

Do not turn.

When the bucket is under load and the machine drives on the slope, if the bucket faces the direction of downgrade, the machine has the danger of rollover.

- When driving down slopes and needing to stop, adopt the braking method of stopping without cutting off the power, i.e. step on the brake pedal. At this time, the power shutoff switch shall

select braking method of stopping without cutting off the power during driving. When using this method that does not cut off the power, do not operate shift control lever or place the transmission case at neutral position. It is dangerous when we do not use the brake force of the engine. If the speed is faster than the shift speed, step on brake peddle to slow down. The load will push the machine down the slope; place the shift lever at the first gear when starting to descend the slope.

- When driving down, the brake force of the engine shall be used for a low speed. If necessary, at the time of using the brake force of the engine, the brake pedle shall be used to control the driving speed.
- When driving the machine on slopes and the engine stops, step down the brake peddle to its full to brake, lower down the bucket to ground, and then use parking brake to fix the position of the machine.
- If the engine stops when the machine is on a slope (grade of slope<15 degree=, step on the brake peddle immediately and lower down the bucket on ground, then use the parking brake. Place the direction and shift control levers at the middle position, then restart the engine. Do not drive on the grass, fallen leaves or wet steel plate at a high speed because in this way, even a very small slope will make the machine slide away. When driving on the slope, the machine shall be directly up and down.

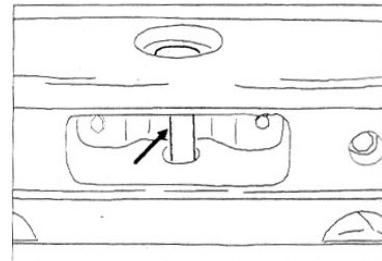
● **5.8 Traction and Trailer**

When hauling a machine that is not able to move, if the method adopted is not correct or the cable wire chosen is defective, injuries or death may be caused.

- Operate in accordance with the related contents in the Servicing Manual and Product Instructions. Other incorrect traction methods may cause people injuries.
- Pad the machine properly to prevent its movement before releasing the brake. If the machine is not padded properly, it may slip and cause injuries and damages. The linkage of the trailer must be firm!
- Both the drawing machine and the machine being drawn shall install ROPS.
- Select proper cable wire. The cable wire to be used shall not have any cutoff strand, kink or shrunken diameter. Wear leather gloves while handling cable wire.
- When preparing traction work with other workers, agree on the signals to be used before starting

the work.

- If the engine cannot be started or brake system is out of order, please contact the manufacturer and repair it.
- It is dangerous to haul a machine on slopes. Select a place where the slope is as flat as possible.
- If the machine that is out of order is to be hauled by another machine, the cable wire to be used must be strong enough to bear the load of the broken machine. When linking the machine to be hauled, nobody is allowed to walk to the space between the drawing machine and the machine to be drawn.
- The coupler of the machine to be drawn shall be in the same straight line of the traction part of the drawing machine and be in place properly.
- Do not stride over the drawing cable or cable wire.
- A traction mechanism is equipped inside the counterweight of the frame of this machine. When needing to haul this machine, or use this machine as the tractor, operate in compliance with the “tractor” instruction.



VI Safe operation

6.1 Keep Good Operation Practice

- Always sit on the seat while operating and make sure to fasten safety belt and safety protective device. The vehicle shall be always at a status under control.
- Operate the control lever of work devices accurately. Manipulate the control levers accurately; avoid misoperation.
- Listen to the sound of the machine carefully. Report for repair immediately when there is an abnormal sound. Do not repair any part that is working.
- The load shall not be heavier than rated load weight. Confirm the weight of load materials beforehand to avoid overload. Chengdu Construction Machinery Co., Ltd is not liable to any machine damages or people injuries caused by overload.
- Do not rush into stockpiles at a high speed. Otherwise the vehicle may be damaged, the operator inclined to be injured and the goods damaged.
- The vehicle shall be kept at a vertical angle to the load material. If operating obliquely, the vehicle is inclined to lose its balance and become unsafe.
 - Before entering into narrow areas such as tunnels, overbridges or garages to work, inspect the conditions of the site.
 - In heavily windy days, load materials down the wind.
- When loading on a truck or a dumper, take care to prevent the bucket from bumping into the truck or dumper. Nobody is allowed to stand underneath the bucket; the bucket shall not be placed above the cab of the truck.
- Stop operation when visibility is lowered by smoke, fog, or dust. Lighting equipments must be installed if the light at work site is insufficient.
 - Remember the following points when operating at nights:
 1. Make sure sufficient lighting equipments have been installed;
 2. Make sure the work lamps on the loader are at a normal status.
 3. Misjudgment of the height of and distance between objects are common when working at nights. Please operate with caution.

6.2 Pay attention to Surroundings of Work Area

- Irrelevant people are not allowed to enter into work area. Because the work device moves

vertically, rotates sideways and moves forward and backward, the surrounding areas of the work device (underneath, in front, at rear, inside, at two sides) are dangerous and is not allowed to be entered into.

- When working near cliffs or at places where collapses may happen, must ensure safety and appoint people to command.
- When releasing earth or rocks from lofty places, take care of the safety at the falling places.

6.3 Ensure Ventilation When Working in Enclosed Space

- When it is not avoidable to operate or handle fuel, or clean parts or paint at an enclosed place or a place not well-ventilated, must open doors and windows to ensure sufficient ventilation in prevention of gas poisoning. If ventilation is still insufficient by opening doors and windows, install fans.
- When working at enclosed spaces, fire extinguishers shall be prepared. Remember their locations and operation method.

6.4 Do not Approach High Voltage Cable

- Do not allow the machine contact with suspended cables. Electric shock may be caused even if approaching to high voltage cables.
- Follow these instructions in prevention of accidents:
 1. When there is a danger of contacting electric cables by the machine at site, consult power company before operation starts to make sure whether the operation is safe. Consult power company for the voltage of cable before the operation starts.
 2. Wear rubber shoes and rubber gloves. Put a rubber pad on the operator's seat. Take care not to let any exposed part of body contact with the metal chassis.
 3. If the work device contacts cable, the operator shall not leave the cab.
 4. When working near high voltage cable, nobody is allowed to approach the machine.

VII Safe parking

7.1 Pay Attention to Safety of Yourself and Others

- Choose a lot as flat as possible to park the machine. Lower the work device down to ground.
- Do not park on slopes. When it is not avoidable to park on a slope, the degree of slope must be lower than 1/5 and wedges shall be put under the wheels to prevent the machine from moving.
- When the vehicle breaks or it is needed to park it at a place where the traffic is busy, set up an enclosure, signal, flag or alarm light, or set up other necessary signals to ensure the vehicles passing by are able to identify this machine clearly. And do not let the machine, enclosure, or flag obstruct traffic.
- When parking, unload the materials in the loader, lower down the bucket completely to the ground, turn off the engine, and press the parking switch button and turn off the power switch. Lock all devices with the key and take off the key.

It is prohibited to climb up the vehicle when it is transporting.

7.2 Notices for Cold Regions

- After completing work, remove water, snow or silt that clings to wires, plugs and sockets, switches or sensors, or the cover parts of these parts. If not removing these stuff, the water contained in them will freeze and cause failure of machine when starting the machine next time. Unexpected malfunction may be inflicted.
- Preheat thoroughly. If the machine is not preheated thoroughly before operating, the reaction of machine be slow, which may cause unexpected accidents.
- Operate the control levers to cycle the hydraulic oil in the hydraulic system (raise system pressure to set pressure, then release the pressure to allow the oil flow back to hydraulic oil tank), which will raise the temperature of hydraulic oil. This will guarantee good response of the machine and prevent failures.
- If the electrolyte in storage battery has frozen, neither charge the storage battery nor start engine by other power supplies. This could be dangerous and cause the storage battery to catch fire.
- When charging or start engine by other power supplies, melt the electrolyte in storage battery before starting and check whether there is any leakage.

VIII Safety inspection and maintenance

8.1 General Knowledge

- The operating and maintenance personnel shall receive trainings and obtain corresponsive qualifications; the people who are irrelevant to the maintenance and repair work being conducted are not allowed to enter into work area. Appoint people to watch over when necessary.
- The repair of vehicles shall be conducted in compliance to specified procedures. When not knowing how to conduct, seek assistance from Chengdu Construction Machinery Co., Ltd.
- Observe the cautions indicated by warnings label. Lables concerning especially important issues are attatched on the vehicle; follow these instructions.
- Before starting maintenance work, adhere labels marked with “please do not operate” or other similar labels on starting swithes and console. Prevent others from starting engine or manipulate control levers. Injuries or death to operator may be caused otherwise.
- When operating or maintaining the machine, shall not wear loose clothes or jewels, or else they may get entangled on the control lever or other parts of the machine.
- Ensure all protective boards and covers are fixed on the machine.
- Fuel and engine oil are harzard items. Fuel, engine oil, lubricant and oil cloth shall not contact any fire or flame.
- The parts removed from the machine shall be stored in a safe place. Make sure that the parts will not fall off. Set up baluster surrouding the place and hang lables of “forbidden to enter” in prevention of approach by unapproved people.
- The work site shall be kept clean and tidy, without cast oil cloth, lubricant, etc., to prevent occurrence of fire or falling off of people.
- Before inspecting and repairing the machine, fix the front and rear frames with lock rod to avoil injuried caused by their rotation.
- When it is necessary to conduct inspection and maitenance work with the movable arm bucket being lifted, must use necessary movable arm oil cylinder support device to prevent falling of the work device and place all control levers at middle position. Lock the neutral shift



lock switch to avoid mis-operation.

- Part the machine on horizontal ground and place the gearshift control lever at neutral position. Place the hydraulic control lever at maintaining position, turn off engine, and turn the key to “0” position, take away the key and engage parking brake. Turn off the master switch.
- Unapproved people are not allowed to be on the machine.
- Put the accessories in order, such as lunch pail, tools or other accessories irrelevant to the machine.
- Understand the hand signals and who commands at sight. Only receive signal from one person.

8.2 Working in Enclosed Places

The waste gas exhausted from engine may inflict sickness and even death. When it is unavoidable to start engine at a enclosed place, use venting device to discharge the waste gas in the area. Open doors for ventilation when no venting device is available.

8.3 Working underneath the Machine

- Park the machine on solid flat ground. Lower down the work device to ground before starting to maintain or repair underneath the machine.
- Keep the tyres in place by wedges.
- If letting the tyres off the ground and supporting only with the work device, it is very dangerous to work underneath the machine.
- Never work underneath the machine which is not properly supported.
- When inspection and repair can only be conducted with the work device being lifted, install oil cylinder safety stand on the piston rod of the moveable arm.

Method of using the protective frame:

Hang the safety stand for the lifting arm at rear frame when not using it.

When using it, take off the safety stand, lift the movable arm until the safety stand completely lock in the pision of movable arm cylinder, install bolts and nuts.

8.4 Working at top of the Machine

- When maintaining at top of the machine, ensure the standing point is clean and free of obstacles.
- Use protective device when necessary.
- The top of engine cover is slippery and hazard and people are not allowed to stand on it.

- The top of tyre is slippery and hazard. Do not stand on it.
- When cleaning the front windows of the cab, stand on fender of the front frame.

8.5 Maintaining When Engine Is Running

Do not maintain when engine is running to avoid injuries. When it is unavoidable to maintain with engine running, comply with the following instructions.

- Appoint one worker to sit on the operator's seat to prepare to turn off the engine at any moment. All workers must keep contact with others.
- Do not touch tail pipe, muffler and other high temperature parts to avoid burnings.
- When the work position is close to rotating parts, there is a danger of being rolled in by the rotating parts. Special care must be taken.
- Do not touch any control lever. When it is unavoidable to manipulate control levers, give out signals to other workers, warning them to walk to safe places.
- Never let any tool or any part of body contact with the fan blades or fan belt. Severe injuries may be caused or else.

8.6 Do not Drop Foreign Matters into the Machine

- When opening the exam windows or oil filler to exam and repair, take care not to drop any foreign matter (such as nuts, bolts, cotton yarn or tools) into the machine. If these articles fall into the machine, must take them out of the machine.
- When repairing, do not carry any unnecessary tools or parts in the pockets.

8.7 Cleaning

- Clean the machine in time. This will avoid the dirts or silt on the machine to splash into eyes. The oil on the machine may cause slip and injuries.
- When cleaning the machine, use incombustible cleaning agent.
- When cleaning inside the machine, turn off engine and place all control levers at middle position. Pull up the parking brake switch and place it at brake position.
- Wear anti-skid shoes to avoid slipping on wet surface when cleaning the machine. When washing machine with pressured water, wear protective clothes.
- Do not jet water directly on electrical units (such as sensors and plugs and sockets of wire). If water enters into electrical system, operation failure may be inflicted.
- When cleaning filter elements with compressed air, must wear protective clothes and goggles.

8.8 Welding Repair

Welding operation shall be conducted by competent welders and at places with proper equipments. Electric welding will generate gas, which may cause fire or electric shock in operation. The following instructions must be observed when welding:

- Disconnect the terminals of storage battery to prevent explosion of storage battery.
- Disconnect the engine's power control unit and power socket connector of the electrohydraulic gear shift controller.
- Remove paints at places where are to be welded to prevent generation of toxic gas.
- If welding on hydraulic equipment or tubes, or at places very close to them, combustible steam and sparkle will be generated, which have a danger of cating fire or exploding. Avoid welding in such places.
- If the splashed sparkles of welding directly fall on rubber hoses, wires or pressured tubes, these pipelines may crack suddenly and the insulation husk of wires may be damaged. Use fire curtain to block the sparkles.
- When welding in places close to tyres, because tyre may explode, special care shall be taken.
- Wear protective clothes when welding.
- Keep the welding site well-ventilated.
- Clean up all combustible materials. Must prepare fire extinguisher at operation sites.

8.9 Repair of Cooling System

- When just completing operation, the temperature of hydraulic oil, oil and water in the engine and radiator is very high and is pressured. At this instance, any attempt to open the oil tank cap, radiator cap, fill oil or water, or replace filter may cause severe burnings.
- In order to prevent hot water from jetting out, turn off engine and allow the water cool down, screw off the caps slowly to release pressure. When checking whether the water temperature has dropped, put hand in front of the water radiator to feel the air temperature. Take care not to contact the radiator.
- In order to avoid burnings, do not touch engine or muffler, tail pipe, relay when the machine is hot.
- In order to avoid burnings, do not disassemble engine oil temperature sensor, water temperature sensor, torque converter sensor or air conditioner water pipe when the machine is hot. The

cooling system contains alkline material; avoid contacting with skin or eyes.

- When replacing coolant, engine oil, transmission case oil, filter and other parts, select appropriate containers.
- Store of liquid and treatment of waste fluid shall comply with local environment protection laws and regulations.
- When disassembling linking pipelines of air conditioner compressor, forbid approach of open flame, or else toxic gas will be generated and poisoning will be inflicted.

8.10 Repair of Hydraulic System

- Before repairing hydraulic system, lock oil cylinder and other hydraulic devices, cool down hydraulic oil, release all system pressure of hydraulic system.
- Do not bend or hammer pressured pipelines. Do not install bended or damaged tubes or hoses on the machine.
- Repair in time any loose or damaged tubes or hoses of fuel or lubricant pipelines, or of hydraulic system.
- Leakage may cause fire, please repair or make replacement in time.
- Please check all pipelines (tubes and hoses) carefully and fasten all joints with specified torque. Do not check for leakage with bare hands; use boards or cardboards. Even the leakage of pressured fluid as minor as a needle eye may penetrate muscles and cause injuries. If solution is jetted to skin, it shall be treated within a couple of hours by surgeons who are familiar with this kind of injury.

Note: when the following troubles are discovered, make replacement.

1. Damage or leakage of joints.
 2. Wear-out of or cut on out layer and bareness of reinforcing wire.
 3. Local bump of outer layer.
 4. Obvious twist or flatness of hoses.
 5. Wire in reinforcing layer is embedded into outer layer.
 6. Displacement of end joints.
- Starting after system servicing: All control components shall be placed at the central position to make the pump under no load while starting up. Start up the engine and make it run for over 10 minutes idly. After the oil temperature is increased, make the engine run under load in order to avoid poor oil absorption of the pump due to ropiness of the oil and damage of the pump

element.

- Any welding and mechanical processing on the accumulator's cover are not allowed. After the connection of hydraulic pipes, the air in the pipe must be discharged by the discharge screw plug on the accumulator. The repairing and pressure connection of the accumulator etc. shall be conducted after the pressure of the oil is released.

Periodical maintenance of hydraulic steering system:

- 1、Check all fastening positions and replace working oil after the initial driving of 50 hours;
- 2、Check oil quantity in oil tank and check all fastening positions after driving for every 10 hours;
- 3、Replenish grease at the front and rear supports of steering oil cylinder;
- 4、Check system pressure (system pressure: 15.5MPa) after driving for every 500 hours;
- 5、Replace working oil after driving for every 500 hours.

8.11 Maintenance of Storage Battery

Must abide by the following instructions on storage battery:

- Never approach lighting cigarettes or open flame to storage battery.
- When needing to contact storage battery in work, wear protective goggles and rubber gloves.
- Immediately use large amount of water to wash in case of splash of electrolyte of storage battery on clothes or skin.
- The splash of electrolyte inside storage battery into eyes may cause blindness. If electrolyte splashes into eyes, wash with large amount of water immediately and go to see doctor without delay.
- If having drunk electrolyte by mistake, drink large amount of water, or milk, or raw eggs, or rapeseed oil, and call for emergency aid of doctor or firstaid center.
- Before conducting works relevant with storage battery, turn off engine.
- Avoid contact with metallic items (such as tools) to cause shortcircuit between the positive and negative poles of the storage battery.
- When installing storage battery, connect the positive terminal first. When disassembling storage battery, disconnect the negative terminal (at the side of ground line) first.
- When disassembling or installing storage battery, firstly check which one is the positive terminal and which one is the negative and fasten firmly the nuts.
- When cleaning the top surface of storage battery, clean with cloth. Never use gasoline, solution, or any other organic solution or detergent.

- Fasten firmly the top cover of storage battery.
- If the electrolyte of storage battery has frozen, neither charge the storage battery nor start engine by other power supplies. This is dangerous and may cause the storage battery catch fire. When charging the storage battery or starting engine by other power supplies, melt the electrolyte of storage battery before starting and check for leakages.
- Remove the storage battery from machine before charging.
- When repairing electric system or conducting electric welding on the machine, remove the negative pole of storage battery to prevent accidental flow of electric loop.

8.12 Charge of Storage Battery

If do not handle storage battery properly when charging it, the storage battery has a danger to explode. Therefore, please follow the charge procedures in handling rules and manual of storage battery, and abide by the following cautions:

- Charge in a place of good ventilation. Take off the top cover of storage battery. This will enable hydrogen diffuse and prevent explosion.
- Set the voltage of charge to the same as the voltage of storage battery to be charged. If the set of voltage is not correct, the charger may get overheated and catch fire, which may cause explosion.
- Connect the positive (+) charge clip of charger to positive (+) terminal of storage battery, then connect the negative (-) charge clip to negative (-) terminal of storage battery. The two terminals must be fastened.
- If the charge rate of storage battery is lower than 1/10, adopt rapid charge mode and set the value below the rated capacity of storage battery. If the charge current is too big, leakage or evaporation of electrolyte may be caused, which may in turn cause fire or explosion.

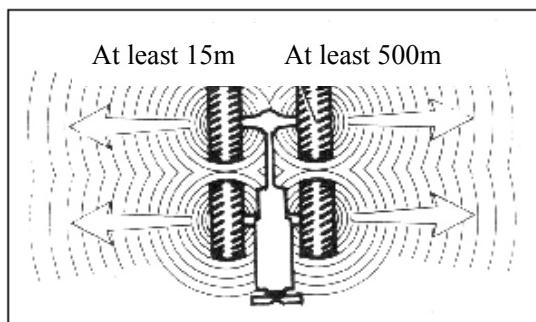
8.13 Maintenance of Tires

- Since an explosion of tire will push the components and parts such as tire, rim and driving axle to the a place about 500 meters or farther away from the machine, and the explosion and fragments will cause serious damages or a human casualty accidents, a normal pressure of the tire must be ensured without any overpressure.
- When the vehicle is running, the heat produced by high speed running will increase tire's pressure, which is normal and do not try to lower it. Speed down or stop to cool the tire down.

Please note: if the vehicle continues to run at a high speed, overheat of tires will likely to result in their explosion.

- When adjusting the pressure, keep away from the tire as far as possible and must stand at back of the tread.
- Combustible gas is forbidden to inflate. Dry nitrogen is recommended. Nitrogen can decrease potential explosion hazard, because it does not support combustion and can prevent rubber from oxidation or deterioration and tire rim from erosion.
- In order to avoid over-inflation, proper tools for nitrogen inflation and related training on use of such tools are necessary.
- Check of tires and rims shall be done every day. It is prohibited to operation under low pressure. Check for presence on the tires such phenomenon as cracks or blisters.
- Checking whether any connecting bolt or nut of tire rim is missing and whether the twisting moment of connecting nut of the rim complies with the value recommended by manufacturer.
- When checking tire, do not enter into places in front of or at back of the roll of tire and shall stand at the side of the tire. If a tire needs to be removed or disassembled, other tires must be fixed in place by wedges.
- When welding operation is conducted near a tire, must be careful because an explosion of the tire is possible to occur.
- Since repair of a tire or a rim is very dangerous, only trained professionals can undertake the repair, using specialized tools and following correct procedures.
- When replacing a tire, the specification of new tire shall be that as specified so as to ensure the sizes and tread patterns of all tires are uniform.

Whenever it is avoidable, do not enter into the range showed in the drawing below.



8.14 Notices on Tire Storage

- As a basic rule, tires shall be stored in a warehouse where any one can not enter into without

permission. If storing tires outdoors, set up fences around the tires and hang a label of "No entrance".

- Since moisture can quicken oxidation of rubber and dirt or oil can corrode tires, the storage place of tires shall be dry and clean. When storing tires, light, heat and air circulation shall be avoided and the tires shall be covered by canvas, plastic clothing or other duster. Incorrect storage practice will adversely affect quality and service lifes of tires.
- The tires shall be placed on level ground vertically and be chocked firmly by wedge blocks so that unapproved touch will not make them fall down. If they are placed horizontally, the tires will be pressed flattened and their quality deteriorated. At least once of rotation (of 90°) shall be made for each tire.
- When tires are falling down, get away quickly. Tires of construction machinery are very heavy, severe injuries may be caused if attempting to hold it.

8.15 Waste

In order to prevent pollution, especially at the living places of human and animals, the following procedures must be followed.

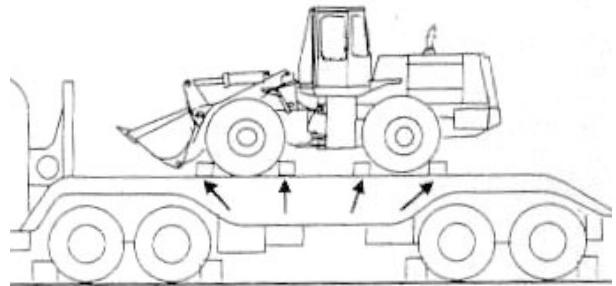
- No pouring the waste oil into the sewer and river etc.
- Place the oil discharged from the machine in a container, not directly discharge it to the ground.
- In processing of harmful substances such as lubricant, coolant, solvent, filter, accumulator and others, the local laws and regulation shall be observed.

The waste tyres replaced shall be placed at an assigned safe place or recycled. Do not discard them randomly.

IX. Safe Transportation

9.1 Loading and Unloading of Loader

- Danger always exists in loading and unloading of loader, which should be conducted very carefully. When loading and unloading, loader engine should be running at a low rpm, and loader should be traveling at a low speed.
- Loading and unloading must be conducted on firm and level ground with safe distance from roadsides being properly kept.
- Tires of carrying vehicle must be fixed during loading and unloading of loader to ensure that carrying vehicle will not move. Cushion blocks should be placed under gangboards.
- Gangboards used must have adequate strength with sufficient width and length to provide a safe slope for loading and unloading. The angle between gangboards and the ground should not exceed 15°, while spacing between gangboards should be adapted to wheel track of loader.
- Make sure that gangboards are firmly positioned with the same height on both sides.
- Make sure that gangboard surfaces are clean and free of lubricant, oil stain, ice and loose materials. Clean loader tires to remove dirt if any.
- Never steer a loader on gangboards. If necessary, reverse the loader to get off gangboards, and then adjust direction before driving onto gangboards.
- After the loader gets onboard, lock its steering mechanism and wedge the tires, then tie down the loader with ropes.



9.2 Road Transportation

- In case the loader is towed by a trailer, provisions in national and local laws on weight, height, width and length must be observed. All related traffic regulations should be observed as well.
- Weight, height, width and length of loader should be taken into consideration when deciding transportation route.
- When passing bridges or constructions on a private premise, first check to see if whether such bridge or construction has an adequate strength to carry the weight of loader. When running on public roads, all related provisions must be understood and observed. Height of passages on transportation route should be surveyed to see whether the height is sufficient for a cabbed loader to go through.

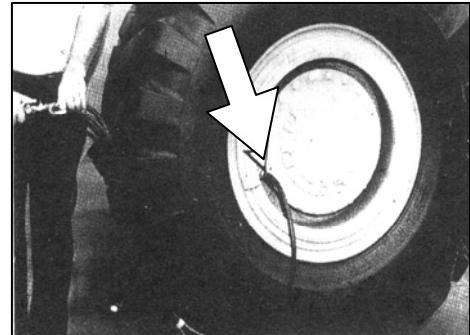
- When other means of transportation are to be used, the loader may need to be disassembled. Please contact Chengdu Chenggong Construction Machinery Co., Ltd. Sichuan or authorized dealers for details.
- Slippage of loader in transportation or transfer should be avoided. Ice or other slippery substances on dock or train wagon must be cleared.

9.3 Running

Consult tire supplier on pressure and speed limit of tires.

Inflate tires to a proper pressure value.

Use a self holding inflating nozzle and always stand aside when inflating a tire. Refer to instructions on “Tire Inflation”.



Add engine coolant, engine oil and gearbox oil to a proper level.

Running of loader is subject to inspection by competent officials for approval if necessary.

The loader should be running at a medium speed, and attention should be paid to all speed limit signs when running.

Always carry out in-process inspection and check liquid levels in all parts.

9.4 Lifting

Lifting instruction is only applicable to short-time lifting of loader in short distance during the shipment of loader.

Do not lift the loader for a long time when maintaining or servicing the loader, otherwise accident may occur to cause personal injury and death.

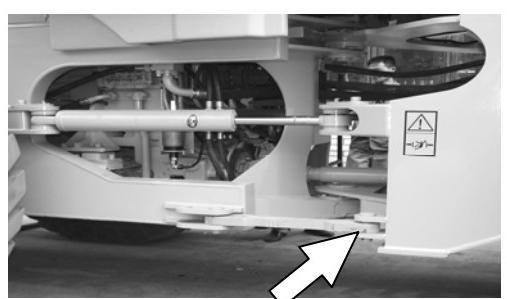
CAUTION

Incorrect lifting may cause deviation of the loader and lead to personal injury or death and other losses.

1. Weight and instructions given below only apply to

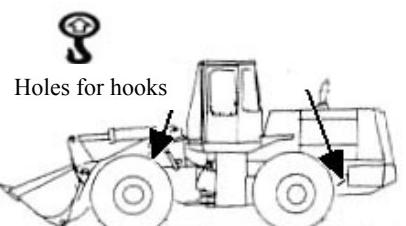
CG938H wheel loader manufactured by Chenggong.

Weight of CG938H is 18400kg.



2. Crane beam should be long enough to avoid contact with the

3. Holes in front and rear frames (two holes each) designed for l



Tie down the loader in different positions and wedge all tires.

Refer to local regulations on lifting weight, width and length.

For shipment of loader please contact Chenggong.

Correct lifting:

Correct lifting:

- Make sure that fixing rods on both front and rear frames are set to “Fixed” position to avoid relative turning of frames when lifting.
- All control levers should be placed in neutral position. No person is allowed to stay in the cab.
- Shut down engine and lock all equipment with keys before taking off keys. Turn off the power switch.
Close and lock right window and left door of the cab.
- Make sure that there is no obstacles or persons in the range of lifting operation.
- Make sure that wire ropes and hooks have adequate strength. A crane must be used for horizontal lifting of the loader.
- Firmly connect wire ropes or hooks with ears marked for lifting on front and rear frames.
- Personal entry into areas under the loader or within the range of lifting operation is strictly prohibited.
- When lifting a loader onto a transportation vehicle or vessel, the loader must be properly fixed with wire ropes with all tires firmly wedged by wood blocks to avoid unexpected movement of loader during transportation.
- After the lifting is complete, always remember to retract fixing rods before steering the loader.

X. Trailer

WARNING

Incorrect towing of loader out of service may cause personal injury and death.

Loader tires must be wedged before releasing brakes to avoid loader movement. In case tires are not properly wedged, consequential movement of the loader may cause personal injury or death and other losses.

Loader should be properly towed as per the following instructions.

Note that these instructions are applied only in emergencies to tow a loader out of service when moving distance is within several meters and the speed is no higher than 2km/h to trail the machine to service area. For long-distance move a transporting van will be needed.

The trailer should have a shield to protect operator in case towing line or towing lever breaks.

Machine to be towed is not allowed to carry people unless an operator is necessary to control direction or brake.

Make sure that the towing line or towing lever is in good order and has adequate strength to pull the machine before operation. The towing line or towing lever should be capable of towing a weight that is 1.5 times of machine gross weight to pull the machine out of mud or over a slope.

The towing line angle should be minimized: the angle between towing line and dead-ahead direction should not exceed 30°.

Too fast machine movement will break towing line or towing lever. Slow and smooth machine movement will facilitate the operation.

Generally the trailer should be equipped with adequate brake capacity, weight and power to control the upward movement of both vehicles on slopes and the traveling distance thereof.

The machine should be followed by a larger trailer or other equipment when going down a slope, so as to provide adequate control and braking capacity and prevent the machine from being out of control and rolling down.

For example, a smaller trailer is sufficient in towing the loader on level and smooth road surfaces while a larger trailer is necessary for sloped roads with bad surface conditions. Specific instructions for various situations are not to be further described here.

For more information on towing a loader out of service please contact Chenggong.

Working Engine

CAUTION

If power system and steering system of the loader still works with a working engine, the loader may be towed for a small distance to get out of muddy road or to the roadside.

The operator of machine being towed must steer in the direction indicated by towing line.

Make sure that loader is towed in strict accordance to instructions provided in this part.

Shut-Down Engine

Go through the following procedure before towing a loader with a shut-down engine:

1. Connect piston chamber and dedicated hose in the same turning cylinder to allow free movement of turning cylinder.

CAUTION

Make sure that cylinder hose is properly connected before operating the loader. In case the hose is connected in reverse direction, steering system will not work.

2. In case a failure of gearbox or transmission system possibly occurs, dismount driving axle split shaft.

Refer to service manual for information on mounting and dismounting of driving axle split shaft.

WARNING

Loader will lose its parking brake when driving axle split shaft is dismounted, and the slippage of loader may cause personal injury or death.

Wedge all tires to prevent the loader from moving.

Trailer must be firmly connected, or the loader must be towed by two trailers in the same size as or larger size than the loader to be towed. In this case, both trailers should be connected with the loader, one in the front and the other in the back.

Make sure that all repairs and adjustments are done before a serviced loader is reused.

3. Release parking brake.
4. Firmly apply towing lever.

Remove tire wedges and tow the loader slowly at a speed no higher than 2km/h.

Production Information

I. General Information on Loader

1.1 Applicability

Loader is applicable to bucketing, stacking and towing operations in mines, roads, water conservancies and constructions, as well as conveying earth, sands, gravels and other loose materials in stock yard in factories, railway stations and ports.

❖ Requirements for working environment

1. Ambient temperature: -15°C-40°C
2. Elevation: ≤3000m
3. Wading depth: ≤650mm

This loader is a common machine and is not applicable for the flammable, explosive, much dust or noxious gas environment.

❖ Operation prohibited

1. Overload.
2. Directly hang the hanging cable on the bucket tooth to lift the heavy articles.
3. Lift the bucket to excavate on the upper side of the machine.

❖ Precautions:

The precautions for operation, maintenance and safety in this manual are only applied to the use of this machine as per the specified purposes. If the user uses the machine beyond the application scope specified in this manual, Sichuan Chengdu Chenggong Construction Machinery Co., Ltd. will bear no any responsibility for this, and the safety responsibility of such operations shall be born by the user. At any circumstances, the operations against this manual shall not be conducted.

1.2 Profile and Major Parameters



Engine (1), Fuel tank (2), Hydraulic oil tank (3), Working unit (4), Cab (5),



Heat radiator (6), Gearbox (7), Driving axle (8), Batteries (9), Gas tank (10)

Major Parameters and Dimensions

Rated engine power:	116kW
Rated engine speed:	2200r/min
Rated bucket capacity:	2.1m ³
Rated loading capacity:	3.8t
Dump height: (bucket blade /tip)	2949 mm/2786mm
Unloading distance at maximum dump height from (bucket blade/tip):	923mm/1041mm
Lift time of movable arms:	<4.7
Total of “three time” of working unit:	<9.6s
Steering angle:	±35°
Turning radius:	5200mm
Maximum traveling speed::	>34km/h
Length:	7330mm
Width:	2675mm
Height:	3300mm
Operating Mass:	12.5t
Oil pressure in working hydraulic system:	19MPa
Oil pressure in steering hydraulic system:	16MPa

All the above parameters are measured on a loader horizontally parked on hard supporting ground.

The operator should pay attention in operation to limits of various operating conditions, such as soft ground, slope or unbalanced carrying, and correspondingly adopt proper operating mode.

1.3 Scope of Work and Configuration

As one of major construction machines, loader is widely used in bucketing, conveying, unloading and leveling operation of loose materials in addition to light-duty cutting.

The working unit of the loader is independently designed and developed by Chenggong with a self-made standard bucket. Loading weight of the loader should not exceed 3.8 tons.

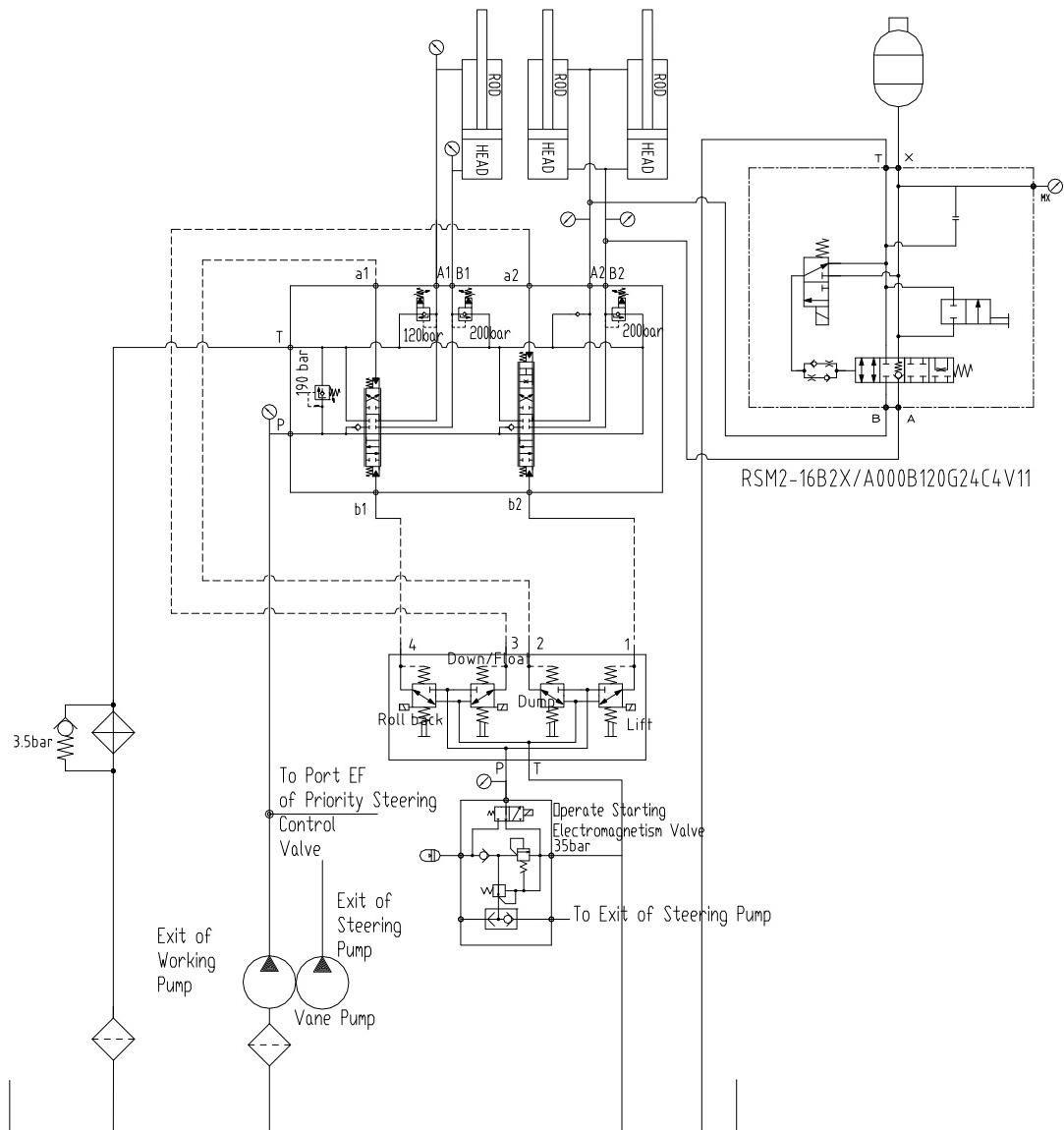
The loader is equipped with QSB6.7 engine manufactured by Cummins Engine Company, Ltd.

Torque-converting gearbox is ZF4WG158 manufactured by ZF Liuzhou Company.

Front and rear driving axles are manufactured by Chenggong.

1.3.1 Description of Implement System

I. System principle:



II System description:

The loader adopts pilot-controlled working hydraulic system with pilot oil coming from delivery side of steering pump. A locking electromagnetic valve is installed on pilot-controlled delivery valve which is powered off when not working. In this case, operation of pilot handle will not activate working unit for safety purpose. Under working status, the locking electromagnetic valve is powered on and the operation of pilot handle will activate the reversing of selector valve plug to realize lifting, lowering of working unit and bucket retracting and tipping, etc.

Pilot system accumulator keeps the pressure at a certain level. In case of sudden breakdown of engine, place pilot handle to lowering position so that the hydraulic oil in accumulator applies a force on valve plug through pilot-controlled valve to lower the movable arms.

In the system, a driving control block, also called as vibration reduction module, is designed. This module leads the oil circuit of the lift cylinder to the accumulator through a switch valve and

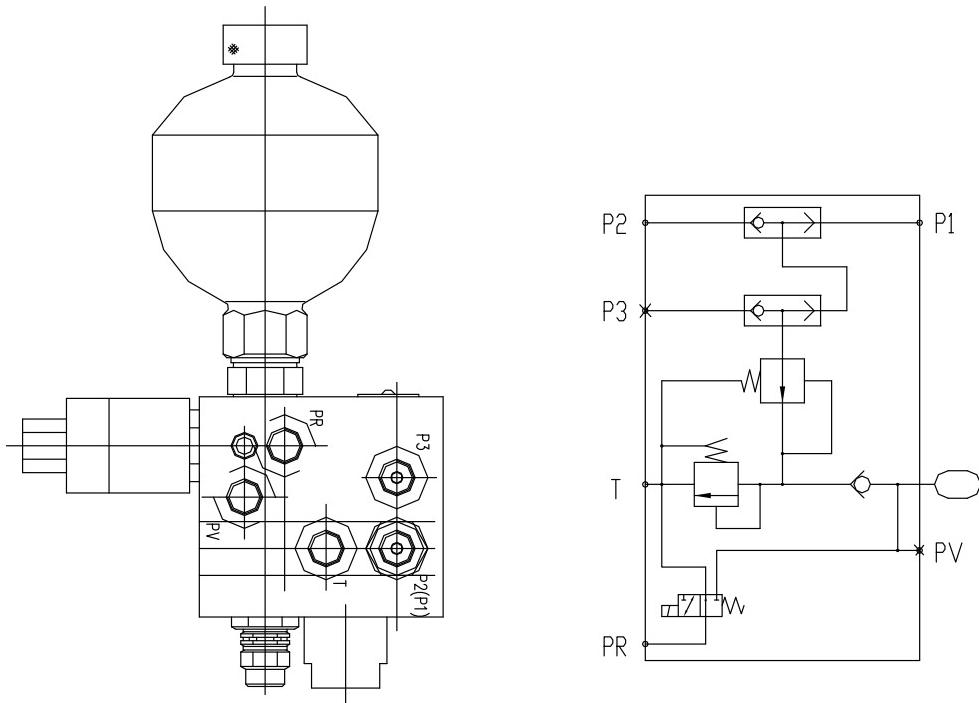
absorbs the load due to dump during driving so as to enable the loader to have a better performance, higher speed, rapid transportation, better shifting performance and shorter braking distance etc.

III. Features of Components

1. Working pump 3520VQS21A12-297DD20R

Working pump is a vane pump; refer to introduction in steering hydraulic system for its structure and operating principle.

2. Pilot-controlled delivery valve Structure and operating principle of pilot-controlled delivery pump are shown in the figure above. Ports P1 and P2 are connected to pump source, port PR is connected to oil inlet of pilot-controlled valve while port PV serves as the pressure tap of pilot system. As the locking electromagnetic valve for pilot handle, when electromagnetic valve is powered off, there is no hydraulic oil pass through pilot system to prevent misoperation of handle from causing safety problems.



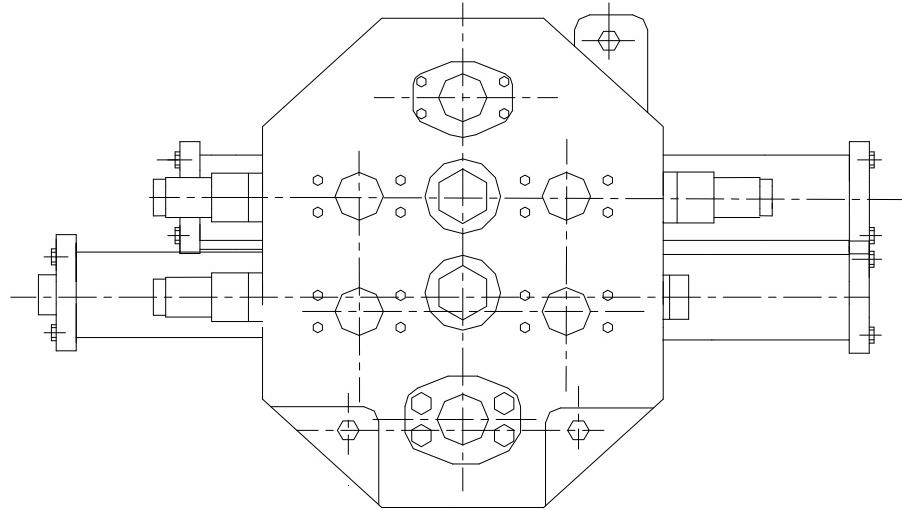
3. Pilot-controlled valve 406—1044—1145

Pilot-controlled valve is a monolevered true motion relief valve integrating oil inlet, oil outlet, tipping port, retracting port, lifting port and lowering/floating port, etc. The position of pilot handle controls the travel of pilot-controlled valve plug, which is in proportion to the pressure at corresponding port to realize proportional hydraulic control over selector valve. Oil inlet of pilot-controlled valve is connected to port PR of pilot-controlled delivery valve for oil source. When the handle is turned to a certain angle, oil from port P enters corresponding valve plug end in selector valve and push the valve plug to achieve retracting, tipping, lifting and lowering operations. Electromagnet

positioning is installed on pilot-controlled valve at lifting, retracting and floating positions.

Note: in case of long-time shutdown, slight steering may be necessary after restarting to provide adequate supply pressure for pilot system before operating pilot handle to do lifting, retracting, tipping, lowering, etc.

4. Selector valve 7130-B

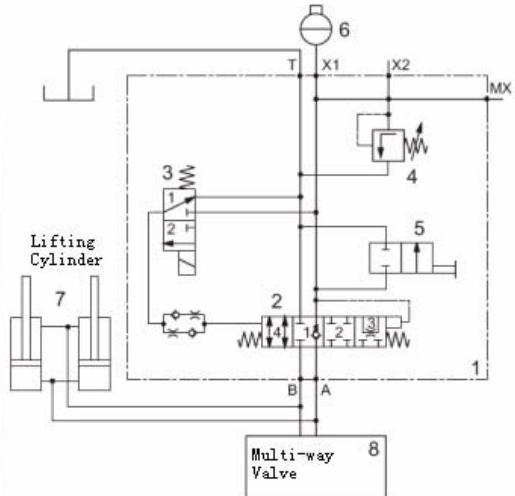


The selector valve adopted for the loader is pilot-controlled hydraulic multi-path change valve, mainly consisting of tipping couplet, moving couplet, main overflow valve, overload valves, inlet check valve, oil filling valve for movable arm chamber, etc. System pressure is adjusted via overflow cock at the inlet. Tipping couplet is equipped with two overload valves to protect tipping cylinder and pipelines.

When the selector valve plug is in neutral position, oil inlet and outlet are connected, so there is no operation of working unit.

Turn the tipping handle, pressure oil in proportion to travel is output by pilot-controlled valve to apply a force on one end of selector valve plug to slowly reverse the plug. As pressure gradually accumulates at oil inlet of selector valve, oil inlet check valve is opened, and pressure oil enters working port to activate working unit.

5. Driving control block RSM16



Lift the oil cylinder (7) to place the pressure on the piston side, the pressure also will be placed on the one-way valve of the valve element (2) and accumulator (6).

Lift the oil cylinder (7) to the oil circuit of the accumulator (6), and close by the valve element (2) (switch to the position 2). In the valve element (2), an internal accumulator (6) has the function of pressure reduction (switch to the position 3). The opening pressure is higher than the shutoff pressure about 30bar (switch to the position 2).

The two-position three-way reversal valve may be switched to the position 2 according to the driving speed of the vehicle ($>8\text{km/h}$). The valve element (2) is switched to the position 4 to collect the piston side of oil cylinder (7) with the accumulator (6), and rod side of lifting oil cylinder (7) with the oil tank.

Overflow valve (4) is designed to prevent impermissible pressure in the accumulator (the opening pressure $<$ allowed pressure of accumulator). This overflow valve is selective upon the user's willing.

Pressure relief of this module:

Prior to maintenance of this system, the pressure of this module shall be relieved. In pressure relief, the loader shall be parked at a safe place, and the protective device of lifting oil cylinder shall be installed well (see the chapter on safety). And then relieve the pressure of the accumulator through the emergency oil discharging screw (5). The position of the oil discharging screen is the position the serial number 1 indicates in the right figure. In the schematic diagram, it is a two-position two-way mechanical solenoid valve.

V. Troubleshooting of working hydraulic system

No.	Symptoms	Causes	Solutions
A	Insufficient lifting force of movable arms or insufficient bucket turning force	1. Cylinder oil seal is damaged 2. Clearance between selector valve rod and valve body exceeds limits due to overwearing 3. Oil leakage in piping system 4. Severe internal leakage of working pump 5. Low pressure at safety valve 6. Oil intake line or oil filter is jammed 7. Low pilot pressure causes insufficient reversing of selector valve 8. Severe internal leakage of the pump delivering oil to pilot-controlled valve	1. Replace oil seal 2. Replace selector valve or check and repair valve plug 3. Check for cause of leakage and eliminate it 4. Replace working pump 5. Adjust system to nominal value 6. Replace oil and clean oil filter 7. Adjust pilot pressure to nominal value
B	Slow bucket turning or slow lifting of movable arms at high rpm	1. See causes in A 2. Overload valve is blocked	1. See solutions in A 2. Replace or check and repair overload valve

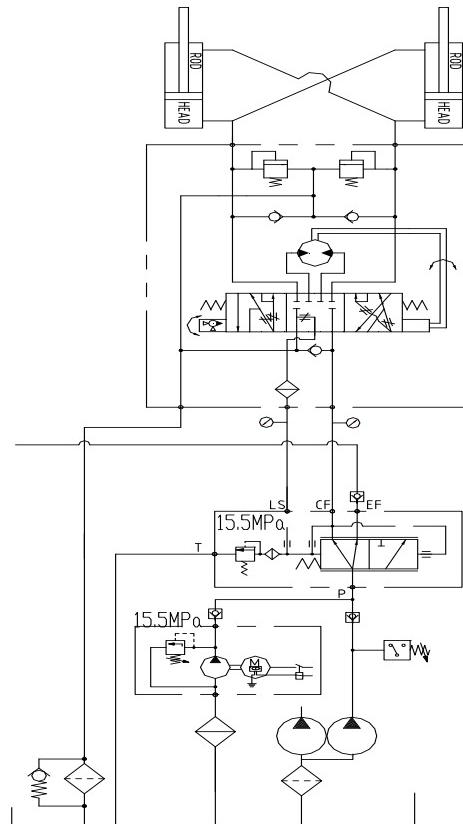
1.3.2 Brake system

The loader adopts original pedal brake valve (06-466-240) and refill valve (06-463-230) manufactured by MICO USA. Refer to Installation and Service Manual of MICO Products – Two-way Refill Valve and Installation and Service Manual of MICO Products – Two-way Serial Pedal Valve for details.

Accumulator manufactured by HYDAC is adopted.

1.3.3 Description of steering hydraulic system

I. Principle:



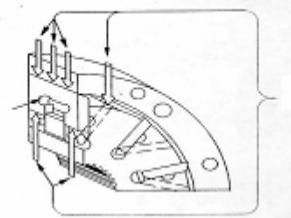
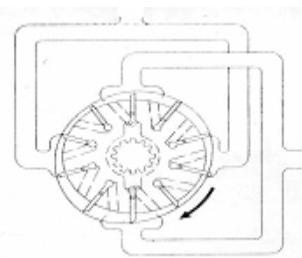
II. System description

Steering system adopts a load-sensing hydraulic steering mechanism mainly consisting of pump, load-sensing steering gear, priority steering control valve, steering cylinder, emergency steering power unit, check valves and pipelines. LS pipeline transfers internal pressure signal from steering gear to priority valve to achieve balance of the valve plug, thus ensuring the flow rate required by port CF. When the pressure at the outlet of the steering pump is less than 8 bars, the pressure switch installed at the outlet will close to drive the emergency steering power unit to realize the function of emergent steering.

III. Description of Components

1. Pump: Denison 3520VQS21A12-297DD20R position is shown in the figure below:

Denison vane pump meets SAE and IOS standards. Hydrocushion design ensures long service lives of shaft and bearing with extremely small noise and high volumetric efficiency. The main internal structure is as shown in the right figure.





Dismounting and servicing of vane pump by untrained maintenance staff is strictly prohibited.



When replacing rubber tube assembly in vane pump, loader engine should be shut off first to release pressure and cool down hydraulic oil (to a safe degree) before the replacement is made.

2. Steering gear: Eaton BZZ-800 static (splined connection)

1、a Operating principle: the functionality is realized by a load-sensing system. The flow rate going through steering gear is quite low when steering gear is in neutral position to keep constant pressure and save energy for the system. During power steering, pressure oil enters stator through valve plug and valve bush, and pushes the rotor to rotate with steering wheel to transfer the oil pressure to the left or right chamber of steering cylinder, thus realizing steering by pushing guide wheel with cylinder piston rod. Oil in the other cylinder chamber returns to oil tank through steering gear.

2、b Installation:

3、Make sure that steering gear installed is coaxial to steering post with clearance kept in axial direction to avoid dieback of valve plug. Check steering wheel to see if opposite rotation is smooth after installation.

4、c Pipelines should be installed as per the four oil ports marked on steering gear:

5、“P” – to be connected with oil pump;

6、“T” – to be connected with oil tank;

7、“L” and “R” are to be connected with left and right chamber of steering cylinder respectively.

8、d Structure of steering gear is given in the right view:

9、e Diagram of FK combination valves:

10、 1. Be careful not to bump or scratch the working surface or end surface of various parts.

11、 2. Do not soak the dismounted rubber ring in gasoline to avoid deformation or deterioration due to action between rubber and gasoline.

12、 3. Dismounting and servicing of steering gear by untrained maintenance staff is strictly prohibited.

13、 4. Simultaneous hard steering by two people is strictly prohibited.

14、 CAUTION

When replacing rubber tube assembly in steering gear, loader engine should be shut off first to release pressure and cool down hydraulic oil (to a safe degree) before the

a Structure and principle



Dismounting and servicing of priority steering control valve by untrained maintenance staff is strictly prohibited.



When replacing rubber tube assembly in priority steering control valve, loader engine should be shut off first to release pressure and cool down hydraulic oil (to a safe degree) before the replacement is made.



Dismounting and servicing of steering cylinder by untrained maintenance staff is strictly prohibited.



When replacing rubber tube assembly in steering cylinder, loader engine should be shut off

first to release pressure and cool down hydraulic oil (to a safe degree) before the replacement is made.

5. Emergency steering:

Steering system features emergency steering function. When a sudden failure occurs to steering pump, etc., pressure in steering system drops quickly and the emergency steering is automatically started when the pressure drops to 2 Mpa (20kg)

Emergency steering power unit: model number: 11551-00.

The ascending flow curve allows emergency steering system to have adequate steering power and velocity. Steering control components is able to turn from neutral position to the position of steering angle measured in B.3.2 (i.e. $38^\circ/2=19^\circ$) in 6 seconds after the operation begins. Forward velocity should be kept at (10 ± 2) km/h, and steering control force should not exceed 350N.

IV. Pressure relief of system:

Turn off engine and then turn steering wheel leftward and rightward for several times to eliminate internal pressure of pipeline system.

Hydraulic oil leakage in pipelines may cause accident and leads to personal injury or death. Leaking pipeline is damaged and should be replaced. When replacing pipeline, first eliminate (release) pressure and cool down hydraulic oil (to a safe degree) before the replacement is made.

V. Lubrication of oil cylinder pin:

V. Lubrication of oil cylinder pin:

The lubrication of fore and rear oil cylinder pin assembly: add lubricant with a grease gun according to the position specified in the figure.

VI. Troubleshooting of hydraulic steering system

Failure	Symptoms	Causes	Solutions
Oil leakage	Leakage on joint faces of parts	Dirt on joint faces	Check and clean joint faces
	Leakage at front cover	Shaft sealer ring damaged	Replace sealer ring
	Leakage at screws	Insufficient tightening torque of screw	Tighten screw
Heavy steering	Steering is heavy in fast turning and light in slow turning	Insufficient oil supply	Check pump and priority steering control valve

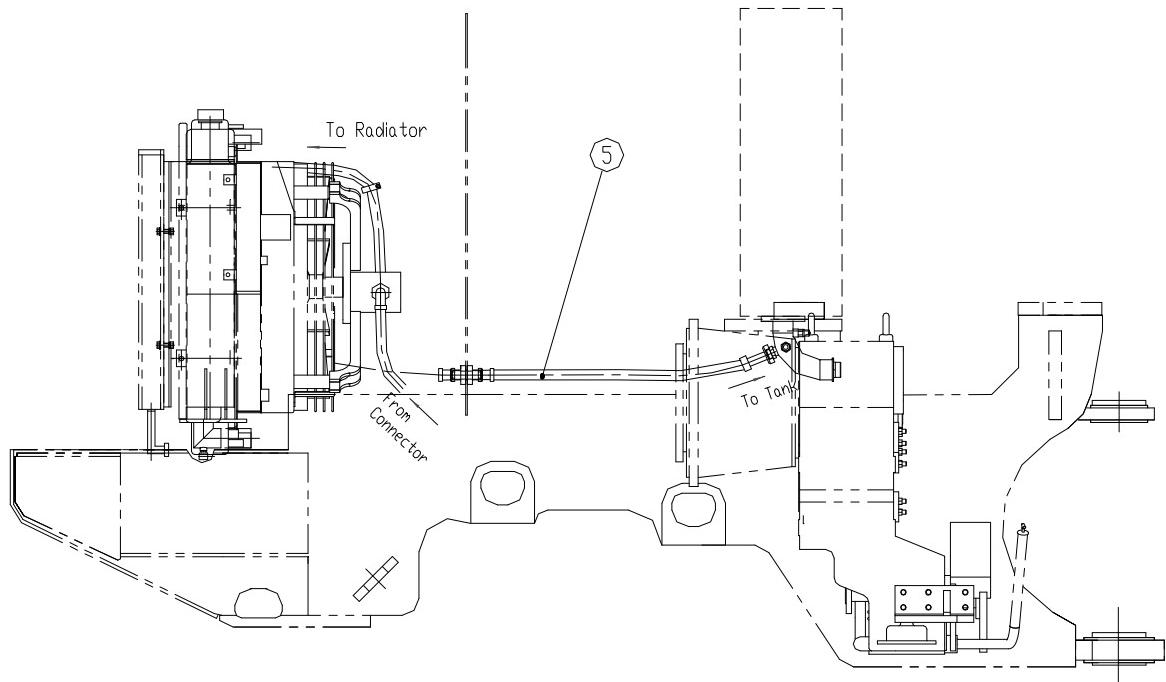
	Oil cylinder crawls with irregular noise and bubbles in oil	Air in steering system	Eliminate air in steering system and check pump inlet for leakage
	Heavy steering, and no steering cylinders do not work	Manual steering check valve failure	Check for existence of steel ball and jam by dirt
	Oil cylinders do not work	Leakage at FK overload valve or in cylinder	Replace FK combination valve and check cylinder for internal leakage
	Light steering with zero load and heavy steering with heavy load	FK safety valve leakage or safety valve spring failure	Replace FK combination valve
	Heavy steering	High hydraulic oil viscosity	
Steering malfunction	No opposite rotation	Spring leaf failure	Replace spring leaf
	Marked increase of pressure runout, and even steering failure	Bent or broken key, crack in universal driving shaft keyway	Replace key or universal driving shaft
	Opposite rotation or wagging of steering wheel immediately after steering	Misplacement of universal driving shaft and rotor	Reassemble
No manual steering	Cylinder piston reaches limit and no sense of steering dead end in power steering, steering cylinders do not work in manual steering	Large radial or axial clearance in stator and rotor	Replace stator and rotor

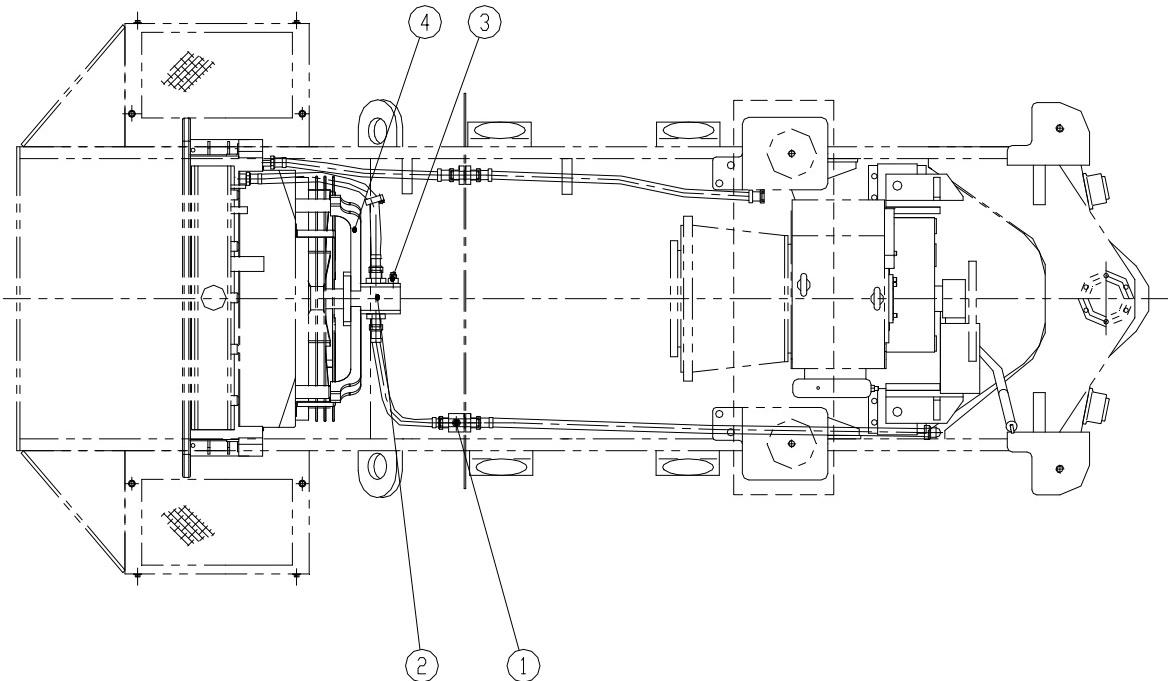
Steering is normal in slow turning and heavy in fast turning	Steering is normal in slow turning and heavy in fast turning	(1). Insufficient oil supply from oil pump (2). Large pressure loss between priority valve and steering gear (3). Priority valve plug blocked (4). Air in control oil circuit between priority valve and steering gear	(1). Repair or replace oil pump (2). Use a priority control spring with larger control pressure, or redesign pipeline with an externally controlled priority valve (3). Turn steering wheel to reach dead end and then keep turning to open steering safety valve for air elimination
Irregular noise and bubbles in oil	Irregular noise and bubbles in oil, intermittent working of cylinder in steering	Air in steering system	(1). Check oil level and add oil to oil tank (2). Check air intake pipeline for air leakage and repair (3). Eliminate air in steering system

6. Cooling fan control system

I. Structure and operating principle of cooling fan control system

1. Diagram of cooling fan control system





(1). Pressure tap: measures motor inlet pressure, (2). Hydraulic motor: WM09A1C230R07TB122HGNNR2320001M, (3). Overflow valve: provided with hydraulic motor, (4). Motor support assembly, (5). fluid coupler

2. CG938H loader adopts an independent cooling system (cooling fan control system) mainly consisting of motor, motor support assembly, coupling flange, fluid coupler, etc., system cleanliness is controlled within Grade NAS1683 9.

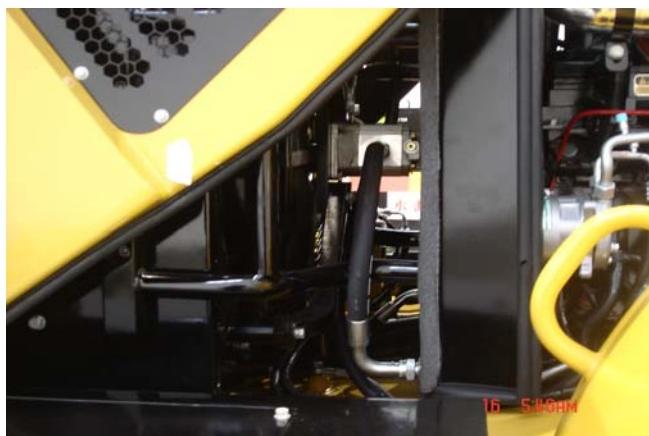
Features of cooling fan control system:

(1). Better cooling effects on hydraulic oil and torque converting oil;
 (2). Cooling effects on hydraulic oil and torque converting oil are not affected even under loaded working conditions of the loader.

System cleanliness is controlled within Grade NAS1683 9.

II. Motor: WM09A1C230R07TB122HGNNR2320001M manufactured by Haldex International Trade (shanghai) Ltd.

Position of motor





Discounting and servicing of motor by untrained maintenance staff is strictly prohibited.



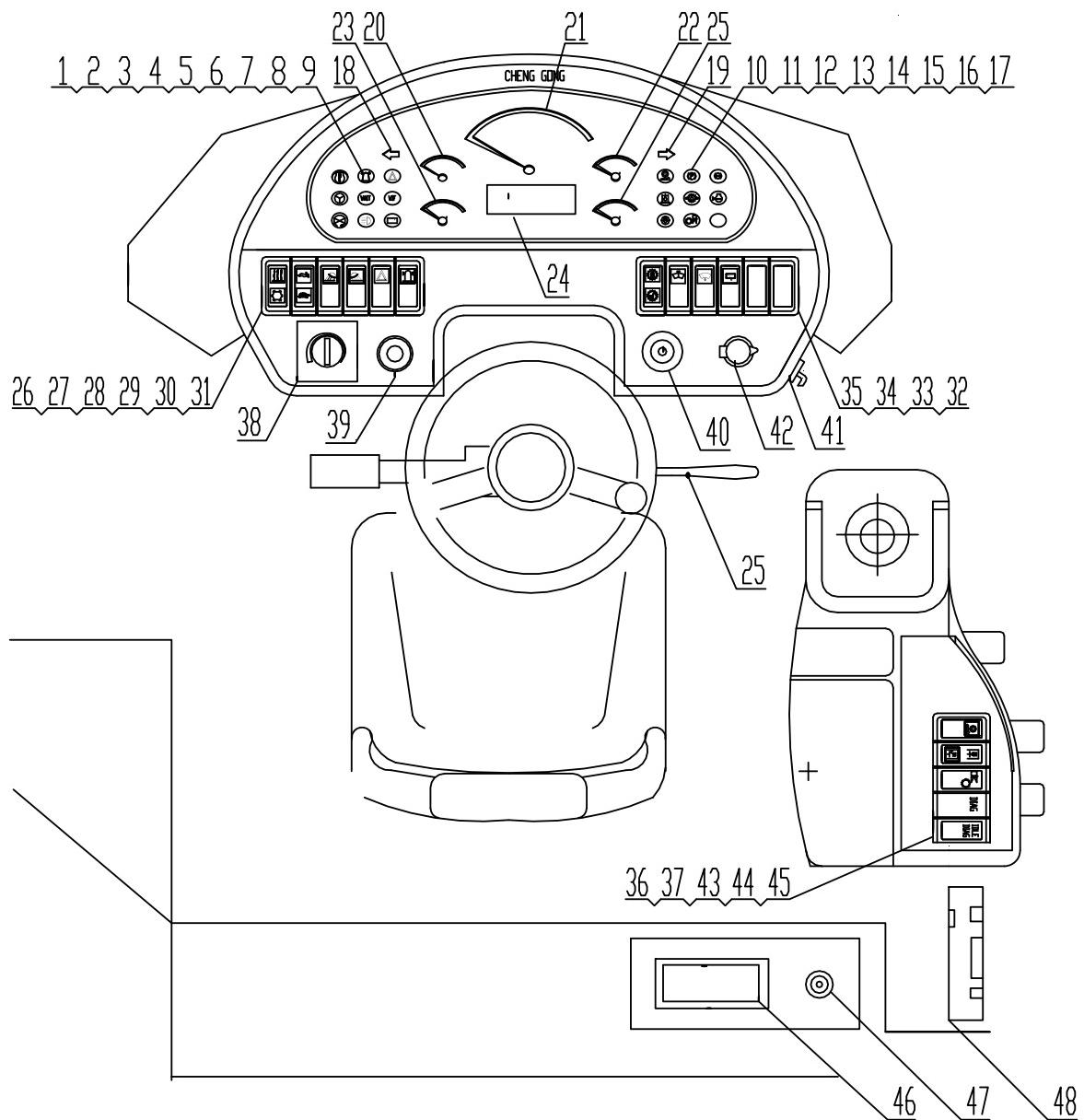
When replacing rubber tube assembly in motor, loader engine should be shut off first to release pressure and cool down hydraulic oil (to a safe degree) before the replacement is made.

IV. Safety marks

All safety marks and meanings thereof for cooling fan control units will be described here.
Operators must read carefully and understand completely these descriptions, which should be
complied with in operation and maintenance. If any mark is damaged, lost or illegible, replace
it with a new one.

II Cab Facilities

2.1 Instrument Desk and Accessories



1. Engine failure signal light
2. Working rotation indicator
3. Emergency warning light
4. Emergency steering signal light

5.  Engine waiting signal light
6.  Signal light for water in engine fuel
7.  Engine shutdown light
8.  Remote indicator
9.  Charging indicator- Indicating the engine and charging system's work
10.  Absorber signal light
11.  Parking signal light
12.  Low-voltage alarming light while braking
13.  Hydraulic oil return blockage alarming light
14.  Gear change alarming light-Indicating the oil pressure of working; the normal value is 1.6~1.8Mpa; alarms 1.6 Mpa below.
15.  Air filter blockage alarming light
16.  Concentrated lubrication indicator
17.  Level alarming indicator
18.  Left steering signal light
19.  Right steering signal light
20. Engine water thermometer -- indicating the temperature of the engine's coolant. The normal

- value is 80°C~92°C;
21. Engine tachometer
 22. Oil-temperature gauge of torque converter-- indicating the working oil temperature of the torque converter. The normal value is ≤120°C;
 23. Engine oil pressure gauge-- indicating engine oil. The normal value is 0.25~0.45Mpa;
 24. Concentrated indication area- indicating the working hours, speed and mileage, gear change pressure;
 25. Fuel gauge
 26. Air-conditioning mode switch
 27. Blowing rate switch of air-conditioning
 28. Front working light switch
 29. Rear working light switch
 30. Emergency warning switch
 31. Working rotary switch
 32. Rear wiper switch
 33. Front wiper switch
 34. Switch of washer pump
 35. Power shutoff selector switch
 36. Idle regulation switch
 37. Failure diagnosis switch
 38. Temperature knob of air-conditioning
 39. Parking button
 40. Cigarette lighter
 41. Key switch
 42. Repairing socket
 43. Intermediate Lube Switch (If Equipped)
 44. Joystick lock switch
 45. Absorber switch
 46. Fuse
 47. Engine Service Tool Connector
 48. Radio

Caution

It is suggested to use the emergency turning system under the circumstance that urgent turning to avoid obstruction is required as the paroxysmal normal turning system fails or engine shuts down.

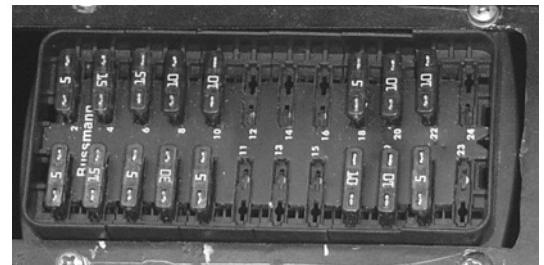
Warning

If the emergency turning system is started frequently, the emergency turning unit will be damaged possibly.

The electrical control system of this loader mainly is composed of two parts including electronic spray engine control system and control system for accessories including lighting, signal and alarm indicators, wiper, emergency shifter, air conditioning, lifting control and leveling control etc.

Warning

Improper external power connection will result in personal injuries and death due to explosion. Accumulators connected in series shall be installed in a separate accumulator box. As the external power source is used, the cable joint (+) shall be connected with the accumulator's joint (+) connected with the starter coil. The cable cathode (-) of the external power source shall be connected with the one of the starter. In case the cathode of the starter is not available, the cable cathode (-) of the external power source shall be connected with the body of the engine.



3) Fuse box

Fuse box-- Installed at the right rear of the chair in the cab.

Fuse--protecting the electrical system from the damage due to circuit overloading. The damaged fuse shall be replaced; in case the same new fuse is blew upon replacement, the circuit shall be examined and repaired.

Caution

In replacement, the fuse of same model and specification is required, or not the circuit will be damaged possibly. In case frequently replacement of the fuse is required, the circuit is involved in failure possibly. The circuit shall be examined.

2.2 Air conditioning System

2.2.1 Basic operating method

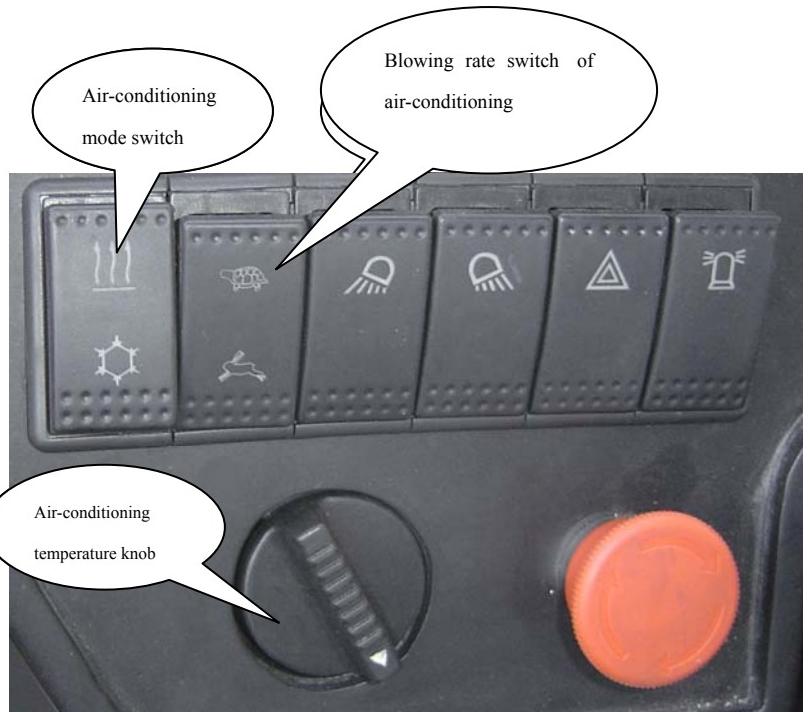
The air-conditioning system has three operation switches and knobs, temperature knob, air-conditioning mode switch and blowing rate switch, designed on the fore panel, as shown in the following figure:

Air-conditioning Temperature knob: It may be rotated anticlockwise or clockwise. If anticlockwise, the temperature is reduced, vice versa

Air-conditioning mode switch: It has three positions. Press the upper position of the switch for heat supply, lower position for refrigeration, and central position, both heat supply and refrigeration are not available.

Blowing rate switch of air-conditioning

The air-conditioning system's rate has three levels. When the blowing rate switch is at the upper position, the rate is at a lower level, and central position middle level, and at the lower position, the wind amount will be increased gradually.



Refrigeration (1) for the first time the cooling system is used, blowing rate switch of air conditioning shall be rotated to the high speed after the engine is started (Air-conditioning mode switch is at a lower position), and run for five minutes.

- (2) Rotate the temperature knob of the air conditioning anticlockwise at full. At this time, the cooling system starts work.
- (3) When the temperature is decreased to the required one, rotate the temperature knob of the air conditioning clockwise slowly until up to the required temperature.

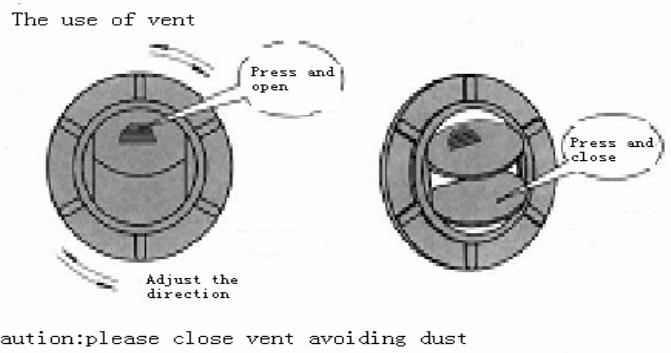
(4) As the cold air is used in high temperature seasons, windows and doors shall be closed, or not the refrigeration effect will be weakened.

- **Note: In refrigeration, please shut off the heat water valve (Make the handle of water valve and heat water pipe at 90°)**

Heat supply (1) The Air-conditioning mode switch is at a upper position Turn off the temperature knob of the air conditioning clockwise at full, turn on the heat water valve and regulate the blowing rate switch.

(2) Appropriate temperature may be attained by regulating the heat water valve.

- As the engine fails to work for ambient temperature less than 0°C, the engine radiator shall be emptied or filled with anti-icing fluid so as to avoid the breakage of the pipe of the radiator of the heat supply system.
- The whole air conditioning system shall not be dismantled without authorization. The repairing shall be conducted a professional person.
- The belt shall be examined frequent for proper tightness.
- The dirt on the surface of condensator shall be cleaned in time so as to avoid weakening the refrigeration effect.
- After discharging secondary refrigerant or repairing, the proper refrigeration oil shall be added depending on the amount of the one discharged. The secondary refrigerant discharged shall be recovered with the special equipment.
- The air conditioning shall be started for refrigeration one time biweekly during the season of winter so as to ensure the smooth operation of the system.



Use of air vent and defrosting function

Air vent--If necessary, the air direction may be changed by regulating the air guide sheet of the air vent.

- As the air conditioning is not used, the air vent shall be closed to avoid the access of the foreign substances.
- As the cold air is used in high temperature seasons, the window and door shall be closed, or not the refrigeration effect will be weakened.

- As the engine is turned off, the air conditioning device shall not be used, or not the energy of the accumulator shall be wasted and difficult starting of the loader will be occurred.
- Please examine and maintain the air conditioning regularly for a long service life.

Maintenance of filter element of air conditioner

The filter element of the air conditioner adopts highly effective air filter. When the air quantity changes or the filter element is dirty, the filter shall be replaced. The filter should be in compliance with ISO 10263-2.

2.3 Accumulator

Two accumulators connected in series are located at the same accumulator box. As the cross strapping is adopted, the anode cable (+) shall be connected with the accumulator's joint (+) connected with the starter coil. The cable cathode (-) of the external power source shall be connected with the one of the starter. In case the cathode of the starter is not available, the cable cathode (-) of the external power source shall be connected with the body of the engine.

The accumulator of this loader is free from maintenance, which is located at the right side of the rear end of the rear frame. For maintenance-free accumulator, the electrolyte may not be examined and water may not be added. It is safe in use and propitious to environmental protection.

Examination over charging state

The charging-state indication densimeter is attached on the cap. It may indicate the charging state:

Green--Power over 65%, indicating that the accumulator is normal.

Black--Power less than 65%, indicating that charging is required.

White--The accumulator is bad and shall be replaced.

Note: In order to ensure enough power of this loader for starting, please examine the charging state of the accumulator. The accumulator will discharge a kind of flammable fog that will cause explosion possibly. The electrolyte is a kind of acid substance and will harm skin and eyes.

Use of external power source

Make a primary diagnosis for the loader that fails to start.

1. Turn the joy stick of the transmission box of the choke to neutral position. Put all working devices down. All joy sticks are placed at the holding position. Turn off the lock switch of the joy stick.

2. Turn the starting pre-heating switch of the choke to the central position and turn off all instruments and air conditioning etc.
 3. Help the started loader close the choke so as to facilitate wire connection. But two loaders shall not contact each other.
 4. Help to turn off the engine of the started loader. If the auxiliary power source is used, the charging system shall be turned off.
 5. Give attention to whether the wire connection of the accumulator is correct and tightened.
 6. Connect the anode (+) of the external power source to the anode (+) terminal of the discharged accumulator or the accumulator of choke.
 7. Connect another anode of the external power source (+) to the anode helping the starting of the accumulator. Identify the correct connector lug with the method of Step 6.
 8. Connect cathode of the external power source (-) to the cathode helping the starting of the accumulator.
 9. Lastly, connect another cathode of the cable to the frame (not the cathode column of the accumulator). The connection position shall be kept away from the accumulator, fuel, hydraulic pipe or moving elements.
 10. Start the engine that helps starting of the loader or close the charging system assisting in starting. Two minutes at least are required to shut down partial charging of the loader.
 11. After starting the flameout engine, the external power source shall be shut down immediately in the reverse order.
- 12.** Summarize the causes for starting or charging failure of the choke. Now, the engine works and the charging system works normally.
- The accumulators connected in series are installed in the same accumulator box. Use the terminal connected with the starting motor. The accumulator and starting motor are situated at the same side of the loader. Any metal shall not contact the anode wire clip.

2.4 Cab

The cab is full closed, in which anti-roll



and anti-falling structures are available. It is spacious and comfortable, and easy to be operated.

Inclination adjustment of steering gear

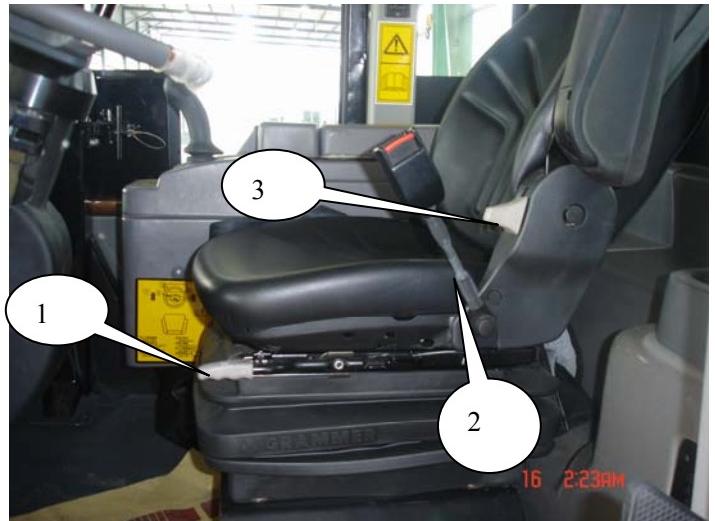
The steering gear may be regulated upwards and downwards depending on the different drivers.

To regulate the steering gear, the steering gear (2) shall be pulled upwards or downwards to the appropriate position according to needs as the adjusting locking rod (1) of the steering gear is pulled upwards, and loosen the adjusting locking rod (1) to lock the position of the steering gear.

Chair

MSG85/722 is the mechanical suspending driver chair with a hydraulic damper. The upper part of the whole chair is arc and has various functions. The suspending unit on the chair chassis is protected by rubber sleeve so as to avoid external sewage and dirt.

Cushion and backrest are made with vacuum foam one-step molding technology



Adjusting range:

- The backrest may be adjusted for 150mm forwards and backwards.
- The adjusting distance of the backrest's elevation is 60mm.
- The adjusting of the backrest forwards is 12°, backwards 10°.
- The journey of the suspending device is 100mm.
- The adjustment between 50-130kg may be conducted according to the driver's weight.

Optional accessories:

- Backing block
- Armrest
- Safety belt

As the fore and rear control locking rod (1) of the chair is pulled upwards, the chair may be moved to the wanted position forwards or backwards, and then release the locking rod to lock the chair.

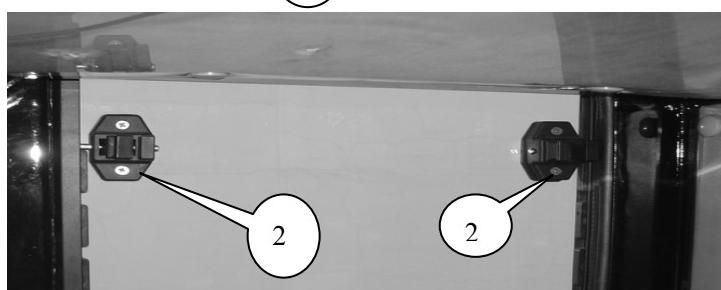
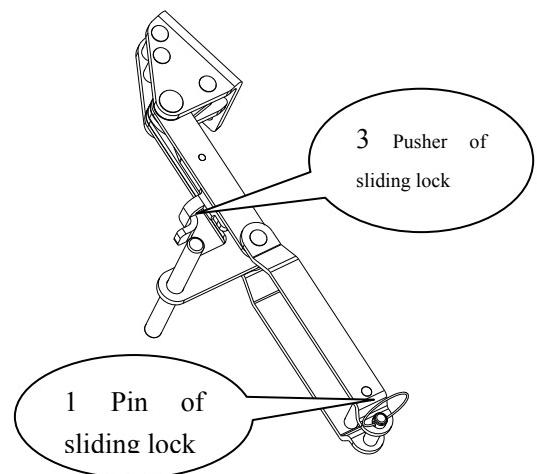
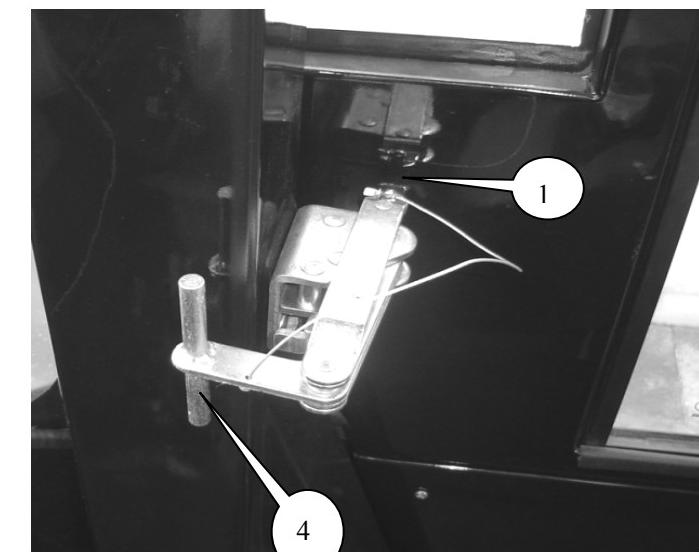
While pull upwards the backrest angle control rod of the chair (2), adjust the backrest to the

required angle, and lay down the control rod to lock the backrest.

Pull out (3) and adjust the elevation by means of rotation.

Right door

The right door is used as the exit, which may be opened only from the internal cab. Loosen the pin (1) to open window. When the right door is used for ventilation, the door may not be opened at full. By pressing (2), the glass of the sliding window may be moved up and down. Loosen (2) to fix the glass at a position. Also by pressing the pusher (3) and then pulling the handle (4), the door may be opened only at a certain angle.



As the right door is fixed on the pin (1), the door is opened at certain degree and fixed.

Note: While using pull lock to open or close the door, the lock (3) shall be pulled so as to ensure smooth rotation. As the loader is working, the window shall be fixed (opened or closed)

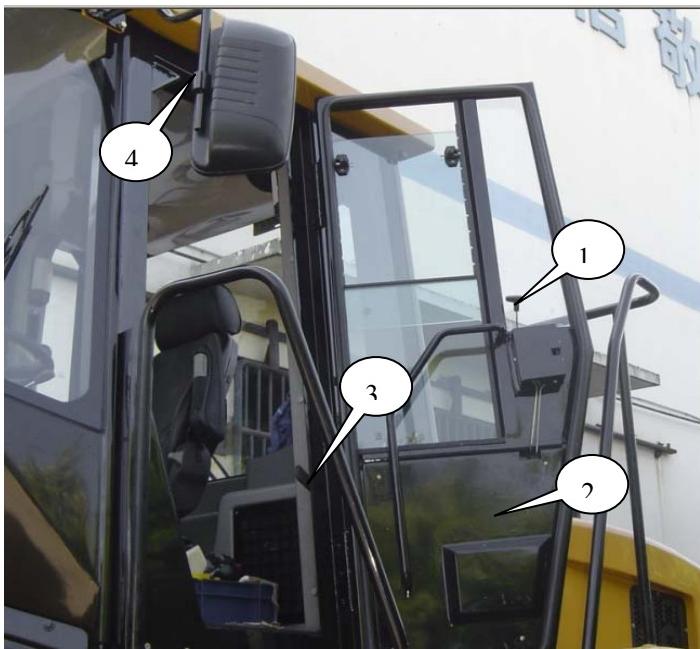
Left door

The left door of the cab may be closed or opened. In the cab, the operator shall pull the lock handle (1) and then open the window, and fix the door-hanging lock (2) near the left rear part of the cab. If the door is required to be closed, the door handle in the cable (3) shall be pulled downwards to release the window, and then the window may be closed. As the loader is working, the window shall be fixed (opened or closed).

As the loader is working, the window shall be fixed (opened or closed).

As the air conditioning is used, please close the right window and left door of the cab.

Rear view mirror



Loosen hexagonal bolt (4) to adjust the angle of the rear view mirror

Fire extinguisher

The simple fire extinguisher for crew exploration vehicle adopts ABS dry fire extinguishing powder. On use, make the fire extinguisher upside down, master the handle, unplug the safety bolt, press down the handle and aim at the root part of the flame.

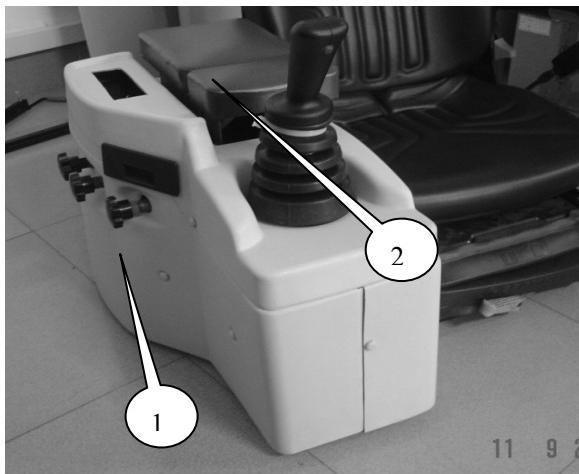
It's usually used on putting out the fires caused by oil products, flammable gas and liquid, electric appliance. It contains 50% ammonium dihydrogen phosphate and is driven by nitrogen. Its application temperature scope is -10°C-+55°C.

The retention period of the fire extinguisher is one year. It shall be examined one time per 6 months. In case its leakage amount exceeds 2g, it shall be added with driving gas.

- Once it is opened, the fire extinguisher shall not be used again. Placing it upside down is now allowed.



Maneuvering box



Loosen (1) by rotation to regulate the height of the hand holder (2), and then fasten it to lock the height. Pull upward the handle (3), to move the maneuvering box (4) forward and backward.

Rear view monitoring system (selective)

In order to ensure construction security and prevent the occurrence of accidents, a rear view monitoring system may be adopted for good visual field and higher work efficiency in operation.

This system adopts TFT LCD and vibration, dust and water-resisting infrared vidicon and is equipped with low-voltage and overload and short circuit protectors. The vidicon adopts CCD image sensor and may automatically adjust the image quality through the changes of the brightness; the scope of the visual field may reach vertically 135 degrees, horizontally 108 degrees; the valid distance of infrared ray is 18M. The effects are shown in the following figure:



Operating instructions:

When the start key switch is turned to ON position, the system is powered on and the display is under waiting state;

When the gear lever is turned to the back shift position, the display will automatically opens (regardless of auto or manual state of the main body) and display the images transmitted by the pick-up head;

When the gear level is at the neutral or advance position, the display closes the image display.

Operation of display: (as shown in the following figure):

Power switch:

When the operator does not use need system temporarily, the operator may press the power switch (CAM SEL) to turn off the display; and press the power switch again, the display may be turned on; and the display is under waiting state and will automatically work after receiving the video signals.



Contrast and brightness control:

Press the key “MENU”. When the “Contract” appears on the screen, press “+” or “-” to regulate the contrast of the image; Press the key “MENU”. When “Brightness” appears on the screen, press “+” or “-” to regulate the brightness of the image;;

DAY/NIGHT SENSOR

The CDS (brightness sensor) may automatically pre-set the brightness according to the client’s requirements and adjust the brightness depending on the surrounding situation.

Contrast and brightness control:

Press the key “MENU”. When the “Contract” appears on the screen, press “+” or “-” to regulate the contrast of the image; Press the key “MENU”. When “Brightness” appears on the screen, press “+” or “-” to regulate the brightness of the image;;

DAY/NIGHT SENSOR

The CDS (brightness sensor) may automatically pre-set the brightness according to the client’s requirements and adjust the brightness depending on the surrounding situation.

Selection of mirror image/normal image

Press the button (MIR/NOR) to set the image of the display as the reverse image.

When the switch is at the position of the “MIR”, the image displayed is reverse;

When the switch is at the position of the “NOR”, the image displayed is normal.

Adjustment of image scope

The scope of visual field may be adjusted by adjusting the screws of the pick-up head.

System maintenance

If the loader is parked in the sun for a long time and the temperature inside is high, the loader may

be operated after being cooled.

Use the wet soft cloth wringed out to wipe off the display surface. If necessary, soft cleaning agent may be used; strong solvent such as thinner and gasoline are prohibited in order to avoid the damage of the machine. Prior to cleaning, the power shall be shut off. Do not use any liquid or spray cleanser. The hole on the rear cover is designed for purpose of ventilation. Blockage or covering of the vent is strictly prohibited.

Do not open the housing for repairing without authorization in order to avoid electric shock or other damages. For some problems, please ask the professional to solve them.

Operation

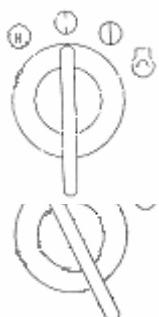
I Operation and Control of Loader

1.1 Start Key Switch

Turn on the power switch firstly, and then turn the key switch to start the engine.

1. The key switch has four positions:

Flameout: The key switch may be inserted or pulled out only at this position. As the switch is situated at this position, the power source of most circuits of the cab will be shut off.



Pre-heating: Turn the key switch anticlockwise to this position to put through preheating device.



Powerup: Turn the key switch clockwise to this position for the power connection of electronic monitor and instruments in the cab etc. When the switch key is rotated to this position, the engine will automatically examine whether it is preheated. If any, the engine's electric control system will open



Starting: Turn the key switch clockwise to this position to start the engine. After starting, release the key switch, the key switch will automatically return to the power-up position.

Notes:

- The running time for starting the engine each time shall not exceed 5 seconds. For the second starting, the interval time of two times shall be over 2 minutes.
- After starting and preheating of the engine, if the alarm lamp lights (including low brake pressure alarm lamp, or engine failure, and fuel-water alarm lamp), the engine shall be stopped immediately for examination. After the alarm lamp lights off, the engine may be operated, or not, your driving safety would be endangered.
- After starting and preheating of the engine, if the low brake pressure alarm lamp lights continuously, the engine shall be stopped immediately for examination. After the alarm lamp

lights off, the engine may be operated, or not, your driving safety would be endangered. In case the brake pressure alarm lamp lights during the period of drive, it shall be stopped immediately for examination.

1.2 Transmission Control, Steering Gear and Horn Switch

Transmission control



Option of driving directions-- Pull forwards the operating rod (1) for advance, and backwards for retrogression

Speed option--Turn the speed operating rod (1). As the arrowhead aims at 1.2.3 and 4, the corresponding driving speed may be attained.

- This loader has four forward gears and three backward gears. As the speed operating rod is at the position of 4 gear, the loader is under the state of retrogression, and only three-gear speed may be attained.

(2) KD key (1) is designed at the topside of the speed operating rod with the purpose to improve the operation efficiency. Its application technology is given below:

1. As the loader advances to and near the stockpile at the speed of II gear, press the KD key (1) for maximum tractive force.
2. As the speed operating rod is turned to the reverse direction upon the completion of loading work, the loader will back to II gear automatically (reverse and advance are II gear) for the relatively high speed to finish the loading work;
3. Repeat steps 1~2 to use the KD key for a higher operation efficiency.

Turning operation

The driving direction of this loader is controlled by steering wheel (2). The turning of the steering wheel means the turning of the loader.

Turn left--Turn the steering wheel (2) anticlockwise, the loader turns left. Faster turning of the steering wheel anticlockwise, quicker turning left.

Turn right-- Turn the steering wheel anticlockwise, the loader turns right. Faster turning of the steering wheel anticlockwise, quicker turning right.

Horn switch (3)--Press the horn switch (3), the horn will alarm.

1.3 Control of Parking Brake

The parking brake is an integral with the emergency brake system. Both are controlled hydraulically. The parking button (1) is designed on the instrument desk.



Caution

The medium of this system is hydraulic oil same as the other hydraulic systems, so other brake liquid is not required.

This system carries out the international standard ISO 3450-1999.

Caution

Only the parking brake oil pressure is over 10.3MPa, the parking brake may be loosened. Therefore, when the loader is running and the oil pressure is less than 10.3Mpa, the parking brake will automatically damp. Therefore, the driver shall watch out the parking brake alarm lamp. Running the loader under the state that the parking brake is closed is not allowed.

Do not use the parking brake while driving under exceptional circumstances, or not, the parking brake will be damaged seriously.

Close parking brake--Press the parking button (1) to close the parking brake.

Loosen parking brake--turn clockwise the parking button (1), the handle will bounce automatically to loosen the parking brake.

Warning

After starting and preheating of the engine, if the low brake pressure alarm lamp lights continuously, the engine shall be stopped immediately for examination. After the alarm lamp lights off, the engine may be operated, or not, your driving safety would be endangered. In case the brake pressure alarm lamp lights during the period of drive, it shall be stopped immediately for examination.

Caution

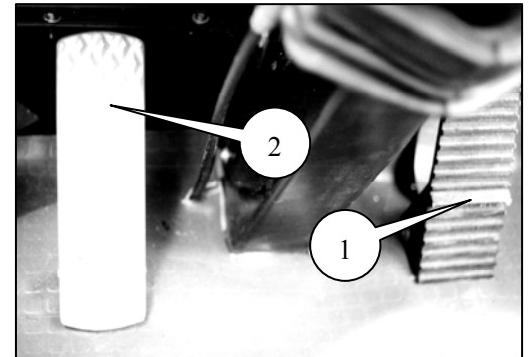
Welding and mechanical processing on the shell of the accumulator are not allowed. Upon the

completion of the connection, the hydraulic pipes shall completely discharge the air through screw plug on the accumulator. The repairing and pressure connection relating to the accumulator etc may be conducted after the oil pressure is released.

1.4 Control Pedal

Accelerator pedal (1)-- The accelerator is an electronic one. The journey under the pedal decides the oil supply amount of the diesel engine.

Service braking pedal (2)-- In service, step on the pedal (2) to reduce speed or stop the loader. And after certain journey under the pedal, the power output of the transmission case may be shut off.



1.5 Flameout Switch

This loader adopts electric control. It is installed with the electric controlled flameout device, i.e. key switch on switch board. Turn off the key switch to flame out the engine.

1.6 Control of Working Device

Precautions:

The hydraulic oil deployed by the hydraulic system must be cleanly.

After the moving arm or rotary bucket is controlled to the wanted position, the pilot-operated control handle shall be back to the central position firstly.

Do not lift the bucket to the highest position to deliver materials. In transportation, the interface point under the moving arm shall be kept for 500mm away from the ground so as to ensure the stable service of the loader.

Prior to each service, the liquid level of the hydraulic oil box shall be examined to ensure the proper oil amount.

The pilot-operated control handle shall be examined whether it stays at the central position.

Examine whether the function of the lock-up solenoid valve of the handle (pilot-operated oil supply valve band) is normal.

Operation:

Usually, the operation way of the loader is joint operation with camion. If the

camion stops, the loader loads skidly. The camion and loader works jointly.

Lifting Control of Bucket

Descend and fluctuation--Push forwards joy stick (1)

to lay down the bucket. If push it forwards further, the bucket fluctuation may be realized.



Keeping--Move back the joy stick (1) to the central position from the lifting or decreasing, fluctuation position, and the bucket may stay at its original position.

Lifting--Pull backwards joy stick (1) to lift the bucket.

- **This loader is equipped with a lifting limit system. When the bucket is pulled backwards to lift the operating rod, the operating rod will be absorbed under the action of electromagnet to make the moving arm finish the lifting automatically until going up to the limit position. Meanwhile, the electromagnet will release the operating rod back the central position and stop the lifting of the moving arm. The different lifting elevations of the moving arm may be attained by adjusting the position of the electromagnet installed on the moving arm.**

Bucket Reversion Control

Reversion--Pull outwards the joy stick (1) for bucket's reversion forwards.

Keeping--loosen the reversed joy stick (1) to make it back to the central position. The bucket will stay at its original position.

Take back--Pull the joy stick (1) inwards to take back the bucket.

- **This loader is equipped with a bucket auto-leveling device. After the bucket unloads, you may pull the bucket backwards to reverse the operating rod. The operating rod will be absorbed under the action of the electromagnet and finish bucket reversion automatically (the descent of the moving arm may be operated at the same time). As it reverses automatically to the bottom of the bucket and stays at the level position, it will automatically stop reversion. This process is named as the auto leveling. Its purpose is to improve the operation efficiency. The bucket bottom level or inclination the lifting elevations of the moving arm correspond to may be attained by adjusting the position of**

the electromagnet installed on the cylinder of turn trolley to meet various working requirements.

Loading:

Advance to stockpile by II gear. When the loader reaches the near area of the stockpile, shift to I gear. Descend the moving arm to make the distance of the interface point under the moving arm away from the ground about 500mm. The bucket shall be parallel to the ground.

As the bucket has a distance of about 1 meter away from the stockpile, the moving arm may be descended to make the bucket near the ground level and into the stockpile.

As the bucket cuts into the stockpile amain, if the resistance is strong, the turn the bucket upwards and lift the moving arm discontinuously for full load.

After the bucket is filled, lift the moving arm to certain elevation, and turn the handle back to the central position.

Unloading:

Load all or partial materials slowly by controlling reversion handle so as to weaken the impact force of the materials against the camion. If the materials are stuck on the bucket, the materials may be unloaded by means of reversing and shivering the bucket repeatedly.

In order to prevent improper operation of the handle after parking and act of moving arm, the loader is equipped with a handle lock-up solenoid valve. The pilot-operated oilway shall be shut down firstly prior shutting off the power of the solenoid valve. At this time, if you operate the handle, the working device will not work. In working, power the solenoid valve.

1.7 Housing rollover

This machine adopts the integral rollover glass steel housing. In the left box of the counter weight, a housing rollover switch is available to realize housing rollover and enclosure.

The rollover turns left to open the housing, vice versa. In the coursing of opening or enclosing the housing, if the housing fails to work, the switch shall not be pulled.



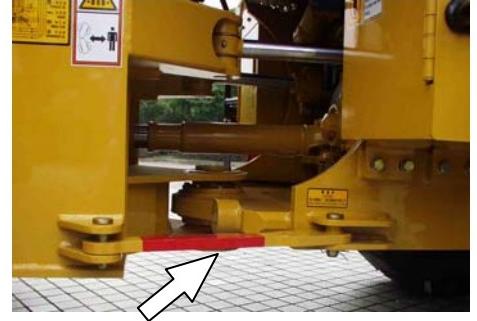
Prior to Starting Engine

In-process Inspection

Dismantle the front and rear frame fixed links and fix them on the rear frame. Prior to the dismantling of the frame fixed links, the loader cannot be started.

For your safety and maximal service life, the in-process inspection shall be conducted prior to climbing up the loader and starting it.

Examine whether there exist screw loosening, garbage accumulation, oil or refrigerant leakage, damage or wear of parts at the surrounding or bottom of the loader. The working device and hydraulic components shall be examined.



For the contents of daily in-process inspection, please refer to the “Maintenance per Ten Hours or Every Day” described in the chapter of “Maintenance”

Examination Prior to Starting

Examine level of the hydraulic oil, engine oil, transmission fluid for torque converter, cooling fluid, and fuel etc.

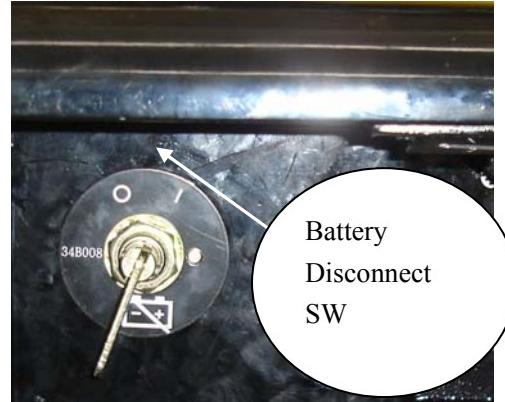
For the detailed maintenance contents, please refer to the “Maintenance per Ten Hours or Every Day” described in the chapter of “Maintenance”.

Regulate the chair to facilitate the driver's stepping on the pedal while leaning on the backrest.

Starting of Engine

Normal starting: this loader is started under neutral gear protection, i.e. when the transmission operating rod is not at the position of neutral gear, the engine cannot be started.

1. Turn on the battery disconnect switch in the left box in the counter weight;
2. Make the shifting handle at the position of neutral gear;
3. Make the parking brake at the position of closure.
4. Make the control rod of working device at the position of keeping. Insert the key to turn on the preheat start switch, and then turn the preheat start switch to start the engine.



注 意

The starting time of the engine shall not exceed 5 seconds. Prior to restarting, the starting motor shall be cooled for 2 minutes.

Starting of external power source

Warning

The accumulator can release the explosive flammable gas.

Any spark near the accumulator is not allowed. The volatile gas produced by the accumulator will cause explosion. Mutual impingement of external power sources or of with loader is not allowed.

No smoking as the level of electrolytic solution is examined.

The electrolytic solution is acidic and will harm skin and eyes. After touching the accumulator and pile head, wash your hands. While maintaining the accumulator, it is suggested wearing gloves.

While starting with the external power source, wear protective glasses.

Improper connection of the external power source will cause explosion and personal injury and death.

The anode (+) and cathode (-) of the accumulator shall be connected with the one respectively.

The voltage of the external power source shall be consistent with the one of the loader, and the power source shall be the accumulator power source.

Caution

As another machine is used for starting, two machines shall not be contact each other so as to prevent the damage of the engine and electrical circuit.

Use of external power

Make a primary diagnosis for the loader that fails to start.

1. Turn the joy stick of the transmission box of the choke to neutral position. Put all working devices down. All joy sticks are placed at the holding position.
2. Turn the key switch of the choke to the central position and turn off all instruments and air conditioning etc.
3. Help the started loader close the choke so as to facilitate wire connection. But two loaders shall not contact each other.
4. Help to turn off the engine of the started loader. If the auxiliary power source is used, the charging system shall be turned off.
5. Give attention to whether the wire connection of the accumulator is correct and tightened.
5. Connect the anode (+) of the external power source to the anode (+) terminal of the discharged accumulator or the accumulator of choke.

Note: The accumulators connected in series are installed in the same accumulator box. Use the terminal connected with the starting motor. The accumulator and starting motor are situated at the same side of the loader.

Any metal shall not contact the anode wire clip.

6. Connect another anode of the external power source (+) to the anode helping the starting of the accumulator. Identify the correct connector lug with the method of Step 6.
7. Connect cathode of the external power source (-) to the cathode helping the starting of the accumulator.
8. Lastly, connect another cathode of the cable to the frame (not the cathode column of the accumulator). The connection position shall be kept away from the accumulator, fuel, hydraulic pipe or moving elements.
9. Start the engine that helps starting of the loader or close the charging system assisting in starting. Two minutes at least are required to shut down partial charging of the loader.

10. Try to start the choke. Please refer to “Starting of Engine”.
11. After starting the flameout engine, the external power source shall be shut down immediately in the reverse order.
12. Summarize the causes for starting or charging failure of the choke. Now, the engine works and the charging system works normally.

After Starting the Engine

Caution

Keep the engine run at a low speed until the pressure of the engine oil pressure gauge is normal. If there is no engine oil pressure within ten seconds, the engine shall be stopped for the examination over causes, or not, the engine will be damaged.

1. Five-minute low-speed unload idling is required to heat the engine. Operate all joy sticks to accelerate the preheating of the hydraulic components.
2. In operation, observe whether the instrument stays within the normal range.

In idling and preheating of the engine, the following items shall be noted:

- In case the temperature is 0°C above, the pre-heating time lasts about 15 minutes.
- In case the temperature is 0°C below, the pre-heating time lasts about 30 minutes.
- In case the temperature is -18°C below or fluidity of the hydraulic oil is poor, long preheating time is required.

Warning

After starting and preheating of the engine, if the low brake pressure alarm lamp lights continuously, the engine shall be stopped immediately for examination. After the alarm lamp lights off, the engine may be operated, or not, your driving safety would be endangered. In case the brake pressure alarm lamp lights during the period of drive, it shall be stopped immediately for examination.

Operation of Loader

In order to avoid industrial injuries, anyone shall not work on or near the loader. At any time, the loader shall be under control.

In driving at the busy downtown area or over a high place, the speed shall be reduced.

Prior to downgrade, the gear shall be selected. In downgrade, the gear shall not be changed. The same gear for downgrade as the one for anabatic driving is a better practical method.

The engine's excessive speed for downgrade is not allowed. In downgrade, the excessive speed of the engine may be reduced by the brake pedal.

The load will push the loader downgrade. At the beginning of downgrade, the gear shift lever shall be placed at the first gear.

For the operation, the following items shall be noted:

1. Regulate the driver's chair.
2. Lift the working device to avoid running against the obstruction.
3. As the braking oil pressure reaches the normal value, the parking brake shall be loosened.
4. Turn the transmission control rod to the required speed position, and pull it to the required direction (at the beginning of machine's start, only I and II gears are available).
5. Step on the accelerator pedal to make the engine at the required speed.
6. Step on the parking pedal to avoid movement of the loader.
7. As the loader advances, the driver shall have a good vision and control sense.

Caution

In order to ensure comfortable operation and maximum service life of driving element, speed reduction or brake shall be conducted prior to change of direction and gear.

Caution

During the period of drive, braking with parking brake will wear and damage the parking brake seriously.

Warning

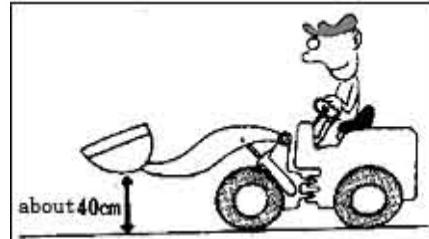
After starting and preheating of the engine, if the low brake pressure alarm lamp lights continuously, the engine shall be stopped immediately for examination. After the

alarm lamp lights off, the engine may be operated, or not, your driving safety would be endangered. In case the brake pressure alarm lamp lights during the period of drive, it shall be stopped immediately for examination.

II Operation Technology

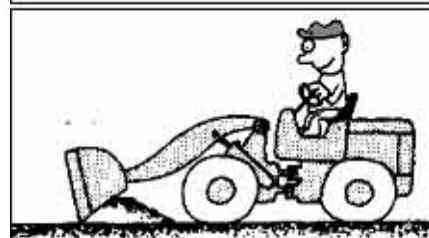
2.1 Common Technology

In operation, in order to widen the drivers' vision and stabilize loading, the bucket shall be lowered and kept about 40cm above the ground.

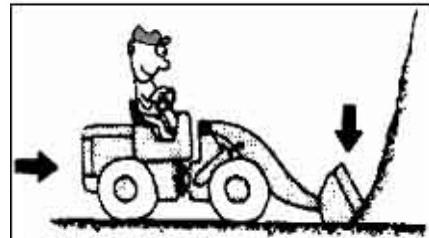
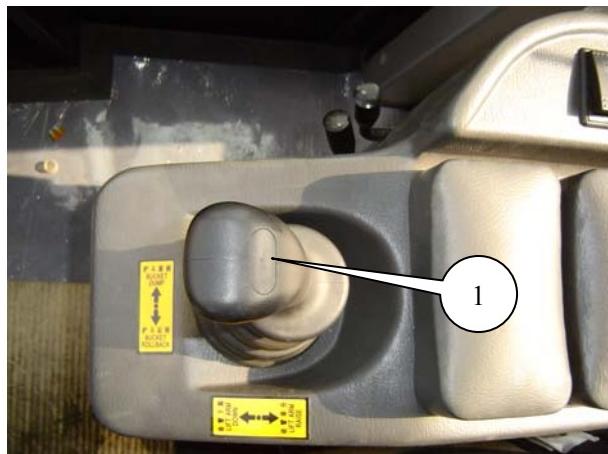


Use the wait time to level the working area.

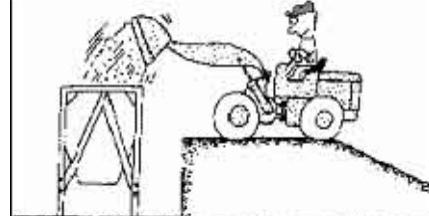
Avoid more stress of the bucket to make the loader have enough tractive force.



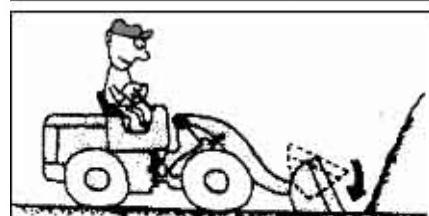
Use cutting teeth to load the relatively hard materials.



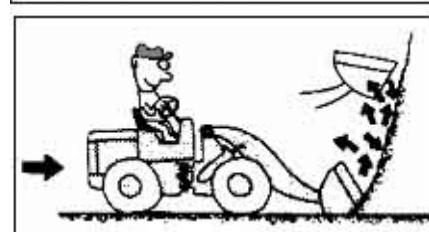
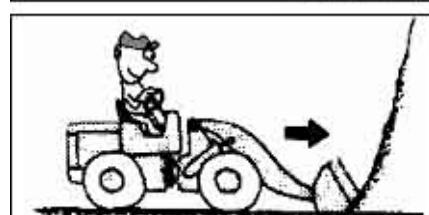
In bucket reversion, the joy stick (1) shall be placed at the position of bucket reversion. And then turn back it to the original position. Repeat the operation until materials are unloaded.



In order avoid dust into the engine and keep visibility, the bucket shall be reversed leeward.



Ensure the bucket is consistent with working requirements. Overload will shorten the service life of the loader.



Scraping

Note: Scraping is not allowed as the bucket is at the forerake position so as to prevent the bucket from damage.

In scraping, the bottom of the bucket shall be parallel to the ground.

Bucket Reversion

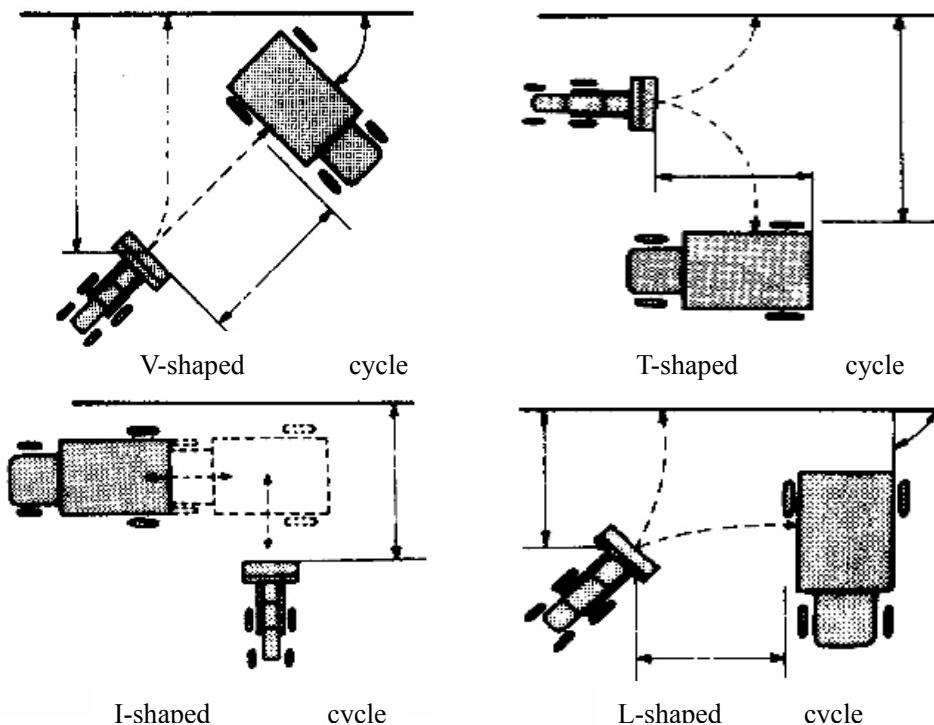
Use the bucket stopper for maximum reversion angle.

- Unnecessary repeated collision with the stopper will accelerate its wear. The charge of repairing linkage gear of the working device is very high.

2.2 Loading of Stockpile

1. Level the bucket and scrape the ground slightly. Hold advance I gear to make the bucket directly insert into the stockpile.
2. Make the joy stick of the moving arm at the position of lifting, and operate the joy stick of the bucket to make the bucket incline backward slowly for 2-3 times for full loading.
3. After the bucket is filled, the bucket stays at the backrake position, and the joy stick of the bucket stays the central position.
4. Lift the bucket enough high to avoid the stockpile. Make the transmission control rod at the reverse gear to drive the loader backwards.
5. As the loader reverses to the certain position, lay down the bucket to the transport position about 40cm away from the ground. Push the transmission control rod to the required gear to transport the materials.
6. As the loader reaches the reversion unloading area, make the joy stick of moving arm at the position of lifting until the bucket unloads all materials.

2.3 Loading with A Truck



For the four loading methods above, the operation method with a short cycle time (for one time of loading) may be chosen depending on the situation on site.

1. Enough distance shall be available to make the bucket reach the lifting height prior to the loader reduce the speed.
 2. Place the bucket at the middle of the truck to unload materials. In case the length of the truck body is two times of the bucket, the materials shall be unloaded to the back from the front of the body.
 3. Advance the joy stick of the bucket to reverse the bucket.
 4. Shake off the materials stuck on the bucket. Rapidly push and pull the joy stick of the bucket to make rocking arm touch the stopper.
 5. Make the joy stick of the bucket at the position of taking-back bucket.
 6. Prior to laying down the bucket, please note whether the truck is outside the bucket.
 7. Lay down the bucket as another bucket will be installed on the loader.
- **Unnecessary repeated collision with the stopper will accelerate its wear. The charge of repairing linkage gear of the working device is very high.**

2.4 Loading of Hard Soil

- The collapse of materials will cause personal injuries and death.

- Remove suspender and note the materials slid.
1. Load hard soil from the bottom to the upper surface
 2. Lift the bucket slightly and leave the soil stack.

2.5 Excavation

1. Lay the bucket on the ground and make it have a small excavation angle.
2. Prior to the loader advances, press the bucket downwards, and make the lifting joy stick of the moving arm at the position of holding when the bucket reaches the enough depth.
3. Keep the bucket leveled scraping and excavation by lifting and laying down the bucket.
4. As the bucket is filled, take back the bucket to make it run against the stopper. Drive the loader to the material unloading position when the bucket is away from the ground for 40cm.

2.6 Loading to Bucket

1. Fill the bucket (See “Loading of Stockpile”).

When the bucket reaches the lifting limit position, materials may be loaded to the chopper leeward if possible.⁵³

2.7 Application of KD Key

The KD key (1) is designed at the topside of the speed operating rod with the purpose to improve the operation efficiency. Its application technology is given below:

1. As the loader advances to and near the stockpile at the speed of II gear, press the KD key (1), and whole machine will be at the speed of I gear from the previous II for maximum tractive force.
2. As the shifting handle is turned to the reverse direction upon the completion of loading work, the loader will back to II gear automatically (reverse and advance are II gear) for the relatively high speed to finish the loading work;
3. Repeat steps 1~2 to use the KD key for a higher operation efficiency.



Loader's Parking

Parking

Caution

The loader shall be parked on the leveled ground. If on a slope, the wheels shall be padded well.

Do not close the parking brake while driving under exceptional circumstances

1. Step on the service parking pedal to stop the loader.
2. Make the shifting handle at the neutral position
3. Close the parking brake.
4. Place the bucket on the ground and press it slightly.

Shutdown of Engine

1. After parking, the engine shall be idled at a low speed for 5 minutes.
2. Turn the key switch to flame out the engine.
3. Take away the key.
4. Hold ladder with both hands and step down along the ladder facing the loader.
5. Examine whether there exist some foreign substances in the engine cover. The foreign substances and paper shall be got rid of to avoid fire. The flammables at the bottom of the loader shall be eliminated to reduce the occurrence the fire.
6. Turn off the power switch
7. Install all protective covers and locks.
8. After parking in winter or at a cold place, if the cooling liquid is not be added with antifreeze, the water drain valve or water blocker on the engine body, radiator and intake etc. shall be opened to discharge the cooling water in order to prevent freezing.

Repairing and Maintenance

Appropriate tools:

We suggest that the user should select the service tools in accordance with the ISO4510 Earth-moving machinery Service tools-Part 1: Common maintenance and adjustment tool. Delivery tools please see the “PACKING LIST”.

Only the tools applicable to the working task may be used. The use of damaged, poor-quality and defective or temporarily substituted tools will possibly result in personnel damage.

Precautions for hammer application

While using the hammer, the operator shall wear safety glasses, safety helmet and other protective clothes, and shall pad one copper bar between the hammer and the part hammered.

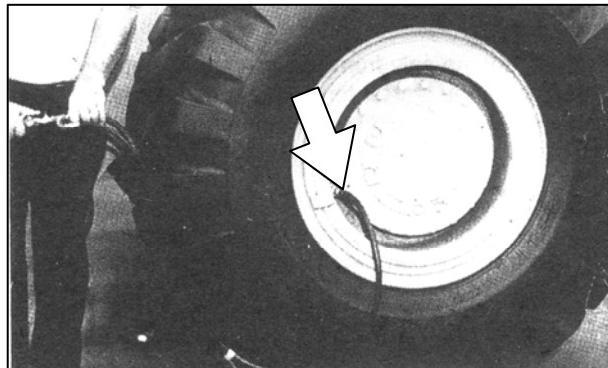
If use the hammer to hammer the hard parts, such as pin or bearing, note that the fragment will fly into and damage eyes.

I Knowledge on Tyre Inflation

1.1 Tyre Inflation with Nitrogen (N₂)

- SICHUAN CHENGDU CHENGGONG CONSTRUCTION MACHINERY CO., LTD. suggests that all rubber tyres and tyres' pressure would be inflated and regulated with nitrogen respectively. Nitrogen is a kind of inert gas and does not support combustion.
- In order to avoid redundant nitrogen in the tyre, proper nitrogen inflation equipment shall be used and necessary training on application of the equipment is required. Improperly using the equipment may result in blowout of tyre possibly, even serious personal injuries and death.
- Because the pressure of the cylinder filled with nitrogen is about 15000kPa, improperly using the inflation equipment will possibly result in blowout of tyre or damage of wheel rim.

- Besides the function of weakening the dangerousness of the explosion, the inflation with nitrogen may also delay rubber's aging and gradually wear of tyres (it is especially important that the tyre has expected service life (four years above). In addition, it may red **In** tyre inflation, an inflation chuck that clips tightly automatically shall be used.



The operator shall stand outside the tyre.

- The set pressure of the modulating valve of the inflation equipment shall not exceed the recommended pressure 300~340 kPa. The press of the tyre inflated with nitrogen shall be same as the one with air. Please consult with the tyre supplier for information on working pressure.

1.2 Regulation of Inflation Pressure

- If the loader works under a cold condition, the pressure for tyre inflation at a warm place of 18°C~21°C is too low. The low pressure will shorten the service life of the tyre.
- Please see working and maintenance manual for the regulation of inflation pressure under a cold condition.

1.3 Purchase of Tyres

The tyre's specification is 23.5-25-20PR, tubeless. As the tyre requires to be replaced, the user may purchase the tyre of same specifications at the local store.

II Standard for Screw Torque

Usually, fasteners will be dismantled in repairing. For reinstallation, the following items shall be noted:

- The bolts and nuts dismantled from the loader shall be kept well for reinstallation. In case a new fastener is required, the size and grade of the new fastener shall be same as the old one.
- The strength of the material is marked with number (8.8, 10.9 etc.) on the head of the bolt usually. The standard torque for the 8.8-grade bolt and nut is given in the following table.

the size of screw thread	standard torque (N.m)
M6	12±4
M8	25±7
M10	55±10
M12	95±15
M14	150±20
M16	220±30
M20	450±70
M24	775±100
M30	1600±200
M36	2700±400

III Daily Maintenance Guide

“Healthy examination” for the loader shall be conducted regularly or irregularly (examination and repairing).

Causes of failure or lower performance of the loader shall be found out early and removed in time. In this way, a higher production rate and long service life may be attained.

- Grease or oil accumulated on the loader will cause a fire. Therefore when the loader works for some time (about 1000 hours), the grease or oil on the loader shall be cleaned with steam or high-pressure water.
- Prior to maintenance, all joints, caps and blocks shall be wiped away.
- Examine leakage carefully. For any leakage, the leakage position shall be found out and repaired.
- In case the leakage is suspected or found out, the liquid level shall be examined regularly.

Caution

In replacement of hydraulic components or pipes, the screw plug of exhaust valve on the hydraulic oil box shall be loosened so as to avoid the outflow of the oil in the hydraulic oil box. Upon the completion of repairing, the exhaust valve shall be fastened again, and then the engine may be started.

- The hinging part of the frame is the central unit connecting with the front and rear frames. Good lubrication of the hinging part can ensure the normal and safety operation of the machine.
- Regularly lubricate the pin of the rotating and hinging parts to extend the service life.
- Regularly examine whether all parts have any deformation, crack or abnormal factor.
- In hoisting, the lifting lug on the frame shall be used. Hoisting weak part and pin hole is not allowed so as to prevent them from damage.
- As the external power source is used to start the engine, please follow the explanation of “Starting of Engine” in the chapter of “Operation”.
- The machine has one 24kv starting system. Starting the engine with the external power source only can use the voltage of 24kv. High-pressure voltage will damage the electrical system.
- Examine the dust and foreign substances on the coarse filtering net. If necessary, the dust

and foreign substances shall be eliminated. Prior to discarding the coarse filtering net, clean it for six times. In cleaning the filter element, examine completely whether the filtered material has any crack. The filter shall be replaced once per year, even if the time of cleaning does not reach 6 times. As the coarse filter is repaired for three times, the thin filter shall be replaced.

After installing a cleanly coarse filter, if the engine discharges black smoke, new fine filter shall be installed.

Caution

Do not try to repeatedly use the fine filtering element by means of cleaning. New one shall be used every time, or not the engine will be damaged possibly.

Maintenance of Engine

In case the clauses relating to the maintenance of engine are not in conformity with the Engine Maintenance Manual, the Engine Maintenance Manual prevails.

IV Maintenance of Engine's Cooling System

4.1 Coolant

Keeping normal working temperature of diesel engine will improve the efficiency of the engine. Therefore it is necessary to maintain the cooling system properly. Overheat, overcooling, pitting corrosion, gaseous cavitation, crack of cylinder end, piston sticking and blockage of radiator are common failures of the cooling system.

- It is suggested to add 30% anti-icing fluid into the cooling mixture. Under the working temperature of the engine, all kinds of water have causticity, regardless of the high concentration of the anti-icing fluid. 3%~ 6% coolant additives shall be added to protect the cooling system.
- Do not add coolant into the overheated engine, or not the engine will be damaged. Prior to adding the coolant upon request, the engine shall be cooled firstly.
- As the concentration of the additive exceeds 6%, and the sum of the additive's concentration and the one of the anti-icing fluid exceeds 65%, sedimentation will be formed, and results in blockage of radiator's pipe, engine's overheat and inefficient sealing of water pump.
- If the machine is stored or transported to the area 0°C below, the cooling system shall be protected as per the possible minimal temperature.
- Under lower temperature, the specific gravity of the coolant shall be examined frequently so as to facilitate taking enough protective measures.
- If the coolant is polluted, the engineer is involved in overheat or radiator has foam, the cooling system shall be cleaned.
- Per 1500 hours or one year, the coolant shall be discharged, and the system shall be cleaned. And new coolant shall be added.
- In case the speed of adding coolant exceeds 20L/min, air bubbles of cooling system will be caused possibly.
- After adding the new coolant, start the engine and uncover the radiator until the coolant is up to the normal working temperature and the liquid level is stable. If necessary, more coolant shall be added in the system until reaching the proper liquid level.

4.2 Cooling Water

- If hard water or water with many calcium or manganese ions mixes with the silicon and phosphorus of the additive in the cooling system, indissoluble compound will be formed easily.
- The tendency that silicon and phosphorus form indissoluble compound will increase with the increase of the water's hardness. After a series of heating and cooling circulation, the hard water or water with many calcium or manganese ions will form indissoluble compound easily.

Usable Water Minimally	
Ingredient of Water	Limit gr/gal (ppm)
Chlorine (CL)	Max. 2.4(40)
Sulfate (SO ₄)	Max. 5.9(110)
Total hardness	Max. 10(170)
Total granularity	Max. 20(340)
PH value	5.5~9.0

- We suggest using distilled water or plasma water to weaken the possibility and severity of the formation of indissoluble compound. ppm= number of particles per one million.
- Using the water that meets this requirement not always prevent the formation of the indissoluble compound, but reducing the rate of deposition for eligible level.

4.3 Anti-icing Fluid

- The coolant shall adopt the eligible water and shall contain about 30% anti-icing fluid so as to maintain the operation temperature of water pump's cavity for a higher efficiency of the water pump.
- To protect the possible minimal ambient temperature, antifreezing agent may be added in the coolant in advance. The amount of the antifreezing agent depends on the antifreezing agent purchased and possible minimal ambient temperature at the machine position. Nevertheless, the concentration of the antifreezing agent in the coolant shall not exceed 60%. Over 60%, the antifreezing protection action on the engine will be weakened and the possibility of precipitation formation in the cooling system will be increased.
- Try best to buy anti-icing fluid with less silicate and proper coolant additive for heavy diesel engine.
- Add properly anti-icing fluid additive

Adding the anti-icing fluid as make-up liquid into the cooling system's liquid is a kind of

unacceptable method. In this way, the concentration of the anti-icing fluid in the coolant will be increased. The mixture of water and antifreezing agent shall be added into the cooling system.

Refer to the following table to determine the concentration of the anti-icing fluid (only as reference, please see the user's manual of anti-icing fluid for details)

Concentration of Anti-icing Fluid	
Protection Temperature	Concentration
-15°C above	30% anti-icing fluid, 70% water
-23°C above	40% anti-icing fluid, 60% water
-37°C above	50% anti-icing fluid, 50% water
-51°C above	60% anti-icing fluid, 40% water

The different anti-icing fluids and additives made by different manufacturers shall not be mixed together. In case the anti-icing fluid and additive must be replaced, the cooling system shall be cleaned, and then the mixed anti-icing fluid and additive may be added.

- Ancillary coolant additive

The coolant additive is used to prevent rust, dust, pitting corrosion and corrosion of the engine's parts due to contact with the coolant. Most anti-icing fluid has no enough ancillary coolant additive.

In the coolant, the additive or corresponding liquid of proper amount shall be added. The coolant cannot be used separately, except the anti-icing fluid with the additive above. Under this circumstance, the additive may not be added. Nevertheless, in the process of maintenance, the additive shall be added.

As the coolant additive is used, the concentration in the cooling system may increase by 3%~6% to prevent corrosion.

In order to excessive antirust in the cooling system of the engine, the concentration of

the coolant additive shall not exceed the maximum 6% we recommend.

For a higher concentration of the additive, precipitation may be formed possibly at the high-temperature surface of the cooling system, and an adiabatic layer may be formed to weaken the heat exchange performance of the engine. The decrease of the heat exchange rate will possibly cause the crack of the cylinder end and other high-temperature parts. The higher concentration of the additive will also increase wear of the water pump's seal.

As the premixed coolant of the anti-icing liquid is not used, the coolant additive shall be added.

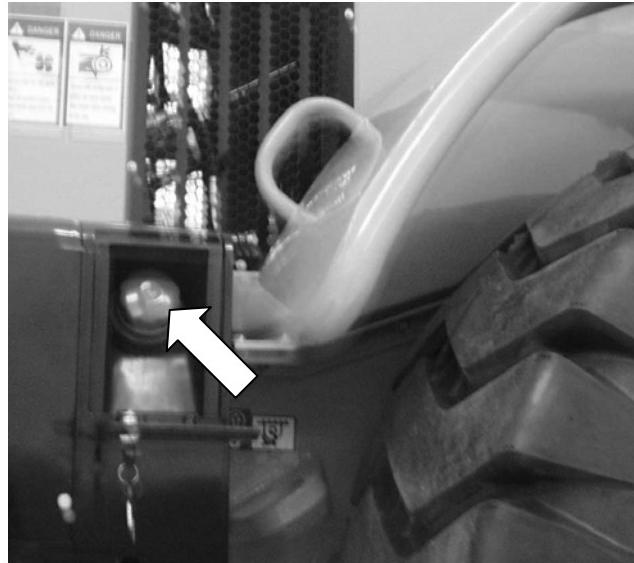
As the coolant is added into the new or reworked engine for the first time, if the antifreezing agent above is not used, 1L ancillary coolant additive or corresponding matter shall be added in each 30L coolant, so the concentration of the ancillary additive in the cooling system occupies up 3%~6%.

In order to maintain the concentration of 3%~6%, every 250 hours or in oil replacement (later or first), the ancillary additive shall be added.

V Use Rule of Fuel

5.1 Precautions on Use of Fuel

- Upon completion of work every day, as the fuel is added, the wet air shall be discharged so as to avoid condensation.
- Do not top off the fuel tank because the fuel possibly expands and overflows as the temperature increases.
- Prior to installing the fuel filter, the fuel shall not be added into the fuel box. The fuel with foreign substances will accelerate the wear of the fuel system's parts.
- The fuel to be added shall be settled for 72 hours to ensure its cleanliness.
- After beginning to add or filling the fuel into the fuel box, retention time of 5-10 minutes is allowed to discharge the water and precipitate from the fuel box.



Upon the replacement of the fuel filter, the air shall be discharged from the system.

- Prior to filling up the fuel box, the water and precipitate in the fuel box shall be discharged weekly to prevent that the water and precipitate access into the fuel system.
- Only the fuel recommended in this section can be used.

5.2 Category of Fuel

In order to offer optimal performance and service life of the engine, the fuel engine for the CCG958G loader allows the use of distilled fuel, i.e. diesel fuel, fuel oil and gas oil.

In order to offer optimal performance and service life of the engine, the fuel engine for the CCG958H loader allows the use of distilled fuel, i.e. diesel fuel, fuel oil and gas oil. The fuel used shall be the light diesel fuel for high-speed diesel engine, which conforms to the state standard GB252-94. If it is used at abroad, the diesel fuel also adopts the NO.1and NO.2 diesel fuel conforming to the USA standard ASTMD975.

Selection of diesel:

Solidifying point of fuel °C	10	0	-10	-20	-30	-40
Ambient temperature °C	> 18	8~18	-2~8	-12~-2	-27-12	-37~-27

See the operating specification of engine for details.

VI Use Rule of Operation Oil

Materials on Operation Oil

Some abbreviations shall be subject to the terms of SAE J754, and others shall be subject to the ones of SAE J183 by levels. In the table of “Density of Operation Oil”, the recommended working density is available.

6.1 Diesel Engine Oil

Please use the following recommended diesel engine oil: API CD/SD, CD/SE, CD/SF, CD/SG or CD.

- The percentage of sulfur in fuel will affect the use of the diesel. For the effect of the sulfur content in fuel, the remaining and ingredients of the engine oil may be evaluated with infrared analysis method and ASTM D2896 procedures. The production of sulfide depends on the sulfur content in fuel, recipe of lubricant, working conditions of engine and ambient temperature etc.
- It is a common rule that the TBN of the diesel oil is 20 times of sulfur content in fuel. It may be modified by analyzing the oil employed. The effect of recipe of the lubricant depends on the ingredient of the additive. The balanced additive mixture of low TBN has the effects same as the additive mixture of high TBN. Based on the analysis on the oil employed, these results may be attained.

Going against the suggestions above may shorten the service life of engine due to carbon precipitate or excessive wear.

Selection of engine oil: The engine oil CF above shall be adopted.

Viscosity	10W	5W/30	10W/30	15W/30	15W/40
Ambient temperature °C	-20～-5	-25～25	-20～20	-10～25	-10～35
Viscosity	20W/40	30	40		
Ambient temperature °C	-10～30	5～30	>25		

This machine adopts SAE 15W-40 Mobil Delvac Super 1300.

6. 2 Hydraulic System Oil



- The hydraulic oil employed may enable the components and hydraulic transmission parts of the hydraulic system to attain a longer service life and optimal working performance. In most hydraulic systems, the following recommended hydraulic oil shall be used: API CC, CC/SF, CD/SF, CD/SG, CD, CE/SF, CE/SG or CE.
- In case the oil of different viscosity is required due to extremely bad ambient temperature, the engine oil recommended by the SICHUAN CHENGDU CHENGGONG CONSTRUCTION MACHINERY CO., LTD. may be used.
- The industrial hydraulic oil that is applied to large load and has anticorrosion, anti-bubble, antirust and anti-oxidation additives may be used.
- This machine adopts Mobil DTE25-antiwear hydraulic oil.

6.3 Transmission Fluid

- Using the oil recommended by the SICHUAN CHENGDU CHENGGONG CONSTRUCTION MACHINERY CO., LTD. may enable the transmission box to attain a longer service life and optimal performance. The oil for transmission box/transmission system oil recommended by the SICHUAN CHENGDU CHENGGONG CONSTRUCTION MACHINERY CO., LTD. is the one in conformity with the API CD/TO-2 code.
- Going against the suggestions above will possibly shorten the service life of the transmission box due to insufficient performance of materials and inconformity of friction materials with the friction requirements.
- Mixture of oil of various levels shall not be used for the transmission box. The oil mixture of various levels uses high molecular polymer as improver of viscosity index. Because of

permanent and temporary shear, the improver of viscosity index loses its viscosity efficiency.

- The oil for transmission box and transmission system cannot be used for the engine, or not the service life of engine shall be shortened.
- This machine adopts Mobil Delvac Super (the level is SAE15W-40).

6.4 Differential Gear and Final Transmission Fluid

- In order to attain optimal service life and performance of the parts of the front and rear axles, the oil of proper viscosity shall be chosen. The differential gear and final transmission fluid recommended by the SICHUAN CHENGDU CHENGGONG CONSTRUCTION MACHINERY CO., LTD. is the one in conformity with the API GL-5 code.
- This machine adopts Mobilube GX HD80W-90.

6.5 Grease

There are many kinds of grease recommended by the SICHUAN CHENGDU CHENGGONG CONSTRUCTION MACHINERY CO., LTD. They are applicable different conditions:

- MPGM

MPGM is applied to heavy-duty roller bearing and joints. The high-pressure grease enables the machine to have its longest service life. Under NLGI NO.2 is applicable to the conditions of most kinds of temperature.

If MPGM grease is not available, the multi-purpose grease containing 3%~5% molybdenum may be used.

- It is recommended to use MPGL (for non-high pressure area).

The NLGI NO.2 grease is used for automatic light-load high-temperature lubrication (175°C). The grease serves good mechanical stability, anti-oxidation and antirust functions, and good separation torque. If this kind of grease is not available, the similar multi-purpose grease may be used.

- This machine adopts molybdenum disulfide lithium-based grease or 3# and 4# calcium-based grease.

6.6 Braking Fluid

This machine adopts hydraulic braking system and does not require the braking fluid separately. The liquid for the braking system is same as the one for the hydraulic system.

All kinds of operation oil shall be cleanly. The oil for hydraulic system shall meet the requirements of NAS9 level.

VII Viscosity and Full Capacity of Operation Oil

7.1 Viscosity and Temperature Range of Operation Oil

Type		Specification and No.	
		The brand number added as the product that has an export destination to a non-low temperature area	The brand number added as the product that has an export destination to a low temperature area
Oil for torque converter and transmission box		SAE 15W-40 Mobil Delvac Super 1300	Mobil Delvac MX 15W-40
Axe lubricant		HD80W-90(Mobilube HD 80W-90)	Same as left column
Hydraulic oil		Hydraulic oil (Mobil DTE 25)	Hydraulic oil (Mobil DTE 15M)
Brake oil	Common axle	DOT 3 Mobil Super Heavy Brake Fluid	Same as left column
	Wet axle		Same as left column
	Hydraulic brake	/	/
Engine oil		0# light diesel fuel	-20# light diesel fuel
Grease		NLGI 2 lithium-based (Mobilgrease HP 222)	Same as left column
Engine oil		SAE 15W-40 Mobil Delvac Super 1300	Mobil Delvac MX 15W-40
Anti-icing fluid		Mobil Antifreeze (Clear water 40%+antifreeze 60%)	Mobil Antifreeze (Clear water 20%+antifreeze 80%)

7.2 Full Capacity of System

Full Capacity (approximation)	
Oil box or system	Liter
Cooling system	33
Fuel box	175
Engine oil	13-15
Transmission fluid	45
Differential gear and final transmission fluid (single unit)	40
Hydraulic oil box	105

VIII S.O.S

S.O.S method is adopted to examine the conditions of the machine and whether the machine requires to be maintained. As each kind of oil is sampled, the lubricant shall be heated and mixed evenly so as to ensure that the sample oil has representativeness.

8.1 Acquisition of Sample Oil for S.O.S

In order to realize the good preventive maintenance scheme, we suggest adopting the S.O.S method to examine the conditions of the machine and whether the machine requires to be maintained. As each kind of oil is sampled, the lubricant shall be heated and mixed evenly so as to ensure that the sample oil has representativeness.

For acquisition of sample oil for S.O.S, several methods are available.

- Insert sample oil doper into the oil groove.
- Use sample oil valve.
- Use discharged oil as the oil is replaced.

Note: We suggest adopting the first or second method. If two methods do not work, the discharge oil may be used.

As the discharged oil is adopted as the sample oil, the oil cannot be sampled from the oil discharged firstly or lastly because it is not mixed evenly and has no representativeness.

8.2 S.O.S (Regular Sample Oil) Analysis

The regular sample oil analysis is composed of three basic tests:

- Wear element analysis.
- Chemical and physical tests.
- Oil status analysis.

The wear element analysis adopts spectrophotometric method to examine the wear degree of components by measuring the concentration of the wear mental elements in the sample oil (unit: number of particles per one million). If the test results deviate from the concentration range of normal wear, we may confirm that the part will be disabled soon.

By the chemical and physical tests, the proportion of water, fuel, and antifreezing agent in the lubricant may be examined.

The oil status analysis adopts infrared analysis method to determine whether the

lubricant has smoke and dust, sulfide, oxide and nitride and measure their amount. The infrared analysis may help us work out the replacement cycle of the lubricant under special working conditions.

The infrared analysis method shall be conducted simultaneously with the wear element analysis method and chemical and physical tests so as to ensure the correct evaluation.

S.O.S Cyclogram				
Oil box	Engine oil	Hydraulic oil	Differential /Final drive oil	Transmiss ion fluid
Time interval	250h	500h	500h	500h

IX Maintenance Interval

9.1 Upon Request

Prior to carrying out any operation and maintenance, the warnings and annotations in this manual's safety chapter shall be read and understood.

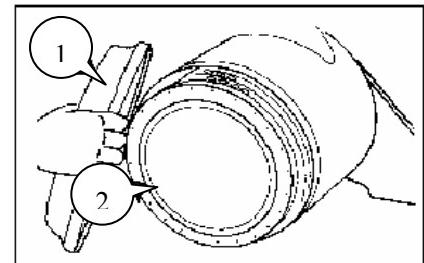
Please refer to the instructions for use and maintenance of the engine for cleaning of air intake system.

Repairing of filtering element

Caution

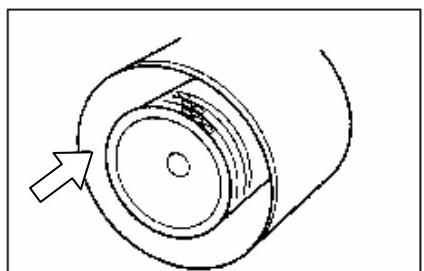
In repairing of air filter, the engine shall be turned off to avoid damage.

Please repair the air filter according to the instructions for use and maintenance of fuel engine. The following steps are for reference only.



Replace/clean coarse filtering element

1. Dismantle the cover of air filter (1);
2. Dismantle coarse filtering element (2) from the shell of the air filter;
3. Clean the shell of the air filter;
4. Clean and examine the coarse filtering element. Please see "Cleaning of Coarse Filtering Element";
5. Installed the cleaned coarse filtering element in the shell of the air filter;
6. Clean and install the cover, and fasten the bolts on the cover with hands not a tool.



After installing a cleanly coarse filter, if the engine discharges black smoke, new fine filter shall be installed.

After being cleaned for 6 times, the coarse filtering element shall be replaced. Even if it is not cleaned for 6 times, it shall be replaced one time every year.

Replace fine coarse filtering element

Caution

After each cleaning of fine filtering element, do not try to reuse it after cleaning.

After the coarse filtering element is repaired for three times, the fine one shall be replaced.

After installing a cleanly coarse filter, if the engine discharges black smoke, new fine filter shall be installed.

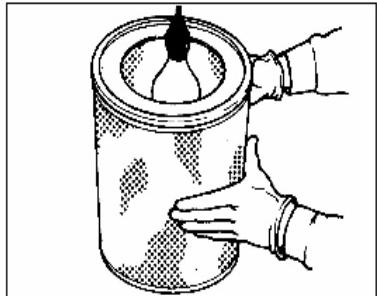
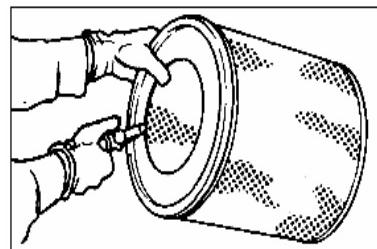
1. Open the maintenance door;
2. Dismantle the cover and coarse filtering element;
3. Dismantle the bolt fixing the fine coarse filtering element and then dismantle the fine filtering element;
4. Cover the air inlet and clean the interior of the air filter;
5. Examine the gasket between air inlet pipe and shell. Any damaged gasket shall be replaced;
6. Open air inlet to install a new fine filtering element;
7. Install the nut and gasket on the screw. The torsional moment of the nut shall be $27\pm7\text{N.m}$;
8. Install the coarse filtering element and cover, and fasten the bolts on the cover with hands not a tool;
9. Close the maintenance door.

Clean coarse filtering element

While cleaning the coarse filtering element, do not strike it, or not, the engine will be damaged.

The filtering element may be cleaned with pressure air, pressure water or cleaning.

1. Induct the air or water along with internal and external wrinkles of the filtering element;
2. After cleaning, examine the coarse filtering element. Do not use the filtering element with a damaged wrinkle, gasket or seal;
3. Pack the cleaned filtering element and store it at a cleanly and dry place.



Accumulator

The accumulator of this loader is free from maintenance, which is located at the right side of the rear end of the rear frame..

All fixed bolts of the accumulator shall be fastened per 1000

hours.

Radiator

Clean or replace the pressure cover

The maintenance door of the radiator cover is designed at the rear topside of the machine.

1. Open the maintenance gate of the radiator.
2. Slowly loosen the radiator cap and release the pressure.
3. Examine the damage, precipitation or foreign substance of the cover, and wipe off the cover with a cleanly cloth or if necessary replace it with a new one;
4. Fit on the cover;

Close the maintenance door.

Clean the exterior of radiator core

Open the radiator cowling at the back of the machine.

The dust, leafs and other foreign substance on the radiator may be removed with compressed air, high-pressure water or steam (compressed air is better).



Fuse

Location: Fuse box is installed at the right lower side of the instrument desk in the cab.

Fuse--It protects the electrical system from damage due to short circuit. If the fuse link is burnt out, a new one of same specification shall be used; if the fuse link is burnt out again, the circuit shall be examined and repaired.

- **Only the fuse of fusing current can be used, or not, the circuit will be damaged possibly. If the fuse requires to be replaced frequently, it is possible the circuit is involved in failure.**

Please examine the circuit.

Windscreen wiper and washer pump

Examination/replacement of the wiper

Examine the brush of the wiper. If it is worn



too mush or damaged, or cracked, the wiper shall be replaced. In the cab, fore and rear wipers are available. For any crack, the wiper shall be replaced.

The washer pump and pot are located in the box at right lower side of the cab. When the level in the washer pot is lower than the pot by half, cleaning liquid shall be added.

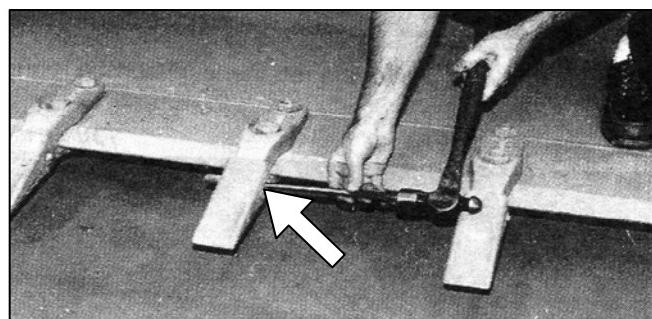


Dipper tooth

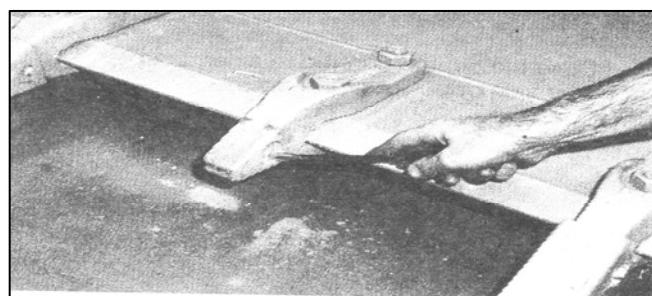
The damaged dipper tooth shall be replaced.

Warning

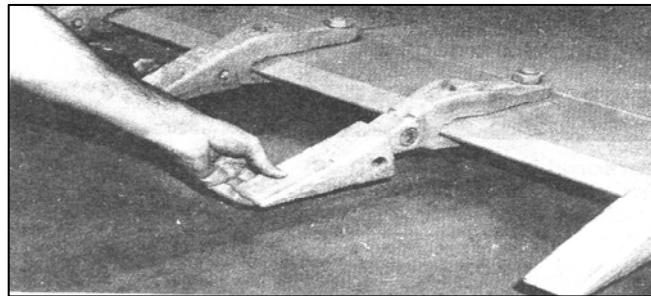
Prior to replacing the dipper tooth, the dipper shall be padded well, or not, it will result in personal injuries and death possibly.



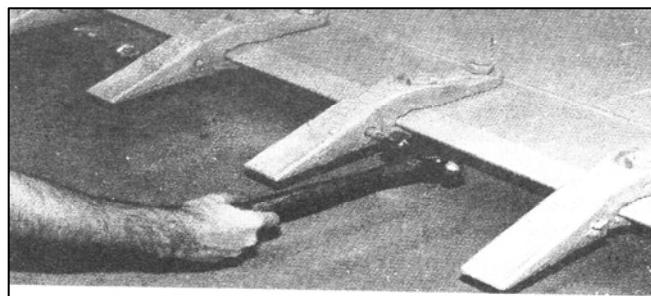
1. Dismantle the pin from the snap ring side of the dipper tooth, and then dismantle tooth sleeve and snap ring;



2. Clean the tooth, pin and snap ring, and install the snap ring in the groove at the side of the tooth;



3. Install a new tooth sleeve on the tooth;



4. Drive the pin into the snap ring, tooth and tooth sleeve from the side of the snap ring.

9.2 Maintenance of Each 10 Working Hours or Every Day

Before carrying out any operation or maintenance, the warnings and annotations in this manual's safety chapter shall be read and understood.

Engine oil

Examine oil level. The oil shall not be excessive so as to avoid the engine from damage.

1. Open the maintenance door at the side of the machine;
2. Keep the oil level between the normal mark on the oil scale;
3. If the oil requires to be added, open the oil filling cap to add oil;
4. Clean the oil filling cap and install it.
5. Close the maintenance door.

Transmission fluid

Examine the oil level. The transmission fluid scale is located at the left side of the machine.

1. In low-speed idling, the oil level shall be kept between two scales of the oil scale;

2. The oil shall be added depending on demand;
3. Clean the oil filling cap and install it.

Hydraulic oil

Examine the oil level. The hydraulic oil box is situated behind the cab and hydraulic oil's level is at left side.

1. Keep the oil level at the middle of the oil level gauge;
2. If the oil requires to be added, open the oil filling cap to add oil with an oil tube;
3. Clean the oil filling cap and install it.

In oil filling, the dipper shall be leveled on the ground.

Cooling system

Examine the level of the coolant. The radiator cap is located in the engine hood behind the machine.

1. Open the maintenance door on the engine hood;
2. Unfasten the radiator cap slowly to release the pressure;
3. Keep the level of the coolant within 1cm under the water filter. If the water requires to be filled every day, please examine the leakage.
4. Examine the sealing of the cap. Any damaged cap shall be replaced;
5. Mount the cap and close up the maintenance door.

Fuel box

Discharged water and precipitate

The fuel box is located at back of the machine, and the discharging screw plug is located at the right bottom of the fuel box.

1. Release the discharging screw plug slowly to discharge the water and precipitate.
2. Fasten the discharging screw plug.

Round examination over machine

Examine machine

1. Examine whether the working device and linkage gear are worn. Any damaged one shall be replaced;
2. Examine whether bulbs and glass are damaged. Any damaged one shall be replaced;
3. Examine and remove the dust and foreign substance on the engine hood;

4. Examine leakage of cooling system, hose failure and dust accumulation status. The leakage shall be removed and foreign substance on the radiator shall be got rid of;
5. Examine the leakage status of the hydraulic system; examine the oil box, soft and hard tubs, screw plug, and joints. Any leakage shall be removed;
6. Examine the leakage status of front and rear differential gears, final transmission, and wet brake;
7. Examine the leakage status of the transmission box;
8. Examine damage and pressure of tyres;
9. Examine whether the covers and hoods are closed and whether they are damaged;
10. Examine ladder, aisle and railing and their cleanliness;
11. Examine the cleanliness of the cab;
12. Examine whether the instruments and switches are damaged. Any damaged one shall be replaced;
13. Examine the rear bumper for optimal vision.

Cleaning of glass window

Clean glass windows with common glass cleaner. Open the windows.

Meters and lamp

Start the engine to examine whether the meter, meter glass and switch are damaged; examine all lamps; blow the electrical horn and turn off the engine.

9.3 Maintenance of A New Loader after Service for 50 Hours

Replace the oil of differential gear and final transmission of the front and rear axles

Maintain according to the following requirements (except otherwise herein provided);

1. Disassemble the oil drain plug of front axle and rear axle, and discharge the oil.
2. Clean the oil drain plug and reinstall it.
3. Disassemble the oil drain plug of front axle and rear axle, and refuel the axle through the oil filling port till bleeding. See figures and tables in “the viscosity and full capacity of oil”.
4. Install the oil drain plug. Start the engine and let it work for a few minutes. Re-check the oil level and refuel to the specified position if necessary.
5. Install the oil drain plug.

Working device and hydraulic steering system

Replacement of hydraulic oil box

The machine shall be on level ground, set all working devices in the ground and exert downward pressure on them. Close the parking brake and shutdown the engine.

1. Disassemble the oil filling cap of the hydraulic tank.
2. Open the vent valve at the bottom of the hydraulic tank and discharge the oil.
3. Close the vent valve.
4. Replace the filter of hydraulic system. See “Hydraulic System” in “Maintenance of Each 500 Working Hours or Every Season”.
5. Disassemble the fuel strainer, clean it and install it.
6. Refuel to the hydraulic tank. See “Viscosity and Full Capacity of Oil”.
7. Check the gasket of the oil filling cap and replace the damaged gasket.
8. Fit on the oil filling cap.
9. Start the engine and run it for a few minutes.
10. Maintain the hydraulic oil level in the middle of the oil gauge, and if necessary, refuel it through the oil filling port.
11. Shut down the engine.

9.4 Maintenance of Each 50 Working Hours or Every Week

Prior to carrying out any operation or maintenance, the warnings and annotations in this manual’s safety chapter shall be read and understood.

- **Firstly carry on the aforementioned examination items**

Lower hinge pin of dipper

Lubricate the hinge pin

Lubricate two hinge pins under the dipper.



9.5 Maintenance of Each 100 Working Hours or Every Two Weeks

Prior to carrying out any operation or maintenance, the warnings and annotations in this manual’s safety chapter shall be read and understood.

Replacement of transmission fluid

After working for 100 hours, the transmission fluid of the new loader shall be replaced.

Start the engine to hear the oil and the machine shall be set at a level position. Set down the bucket and exert downward pressure on it slightly.

Close the parking brake and shutdown the engine.

1. Disassemble the oil drain plug at the bottom shell of the gearbox to discharge the oil, clean and fit on the oil plug.
2. Disassemble the oil drain plug which locates below the torque-converter's oil radiator at the backmost of the machine and discharge the oil. Clean and fit on the oil plug.
3. Replace filter.
4. Fill up oil with special volume into the torque-converter and fill to the high position of the oil gauge when the machine is offstate.
5. Start engine and pedal the service brake.
6. Under the idle speed, slowly manipulate the joystick of the gearbox, and recycle the oil so that oil torque-converter and pipeline may be full of oil. Check the oil level of the torque-converter which shall between the low and high level of the oil gauge.
7. Set the joystick of gearbox at stop short, shutdown the engine and park it well.

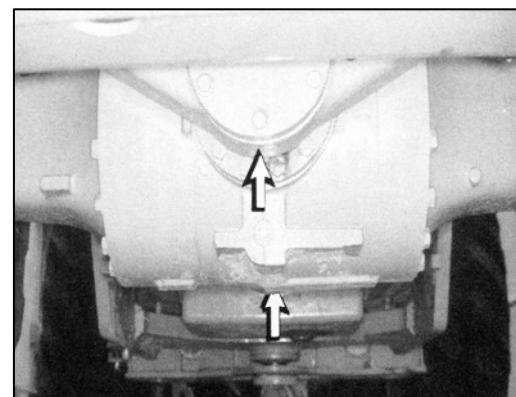
After it is replaced the machine works for 1000 hours later, the transmission fluid shall be replaced once each 1000 hours. If the machine does not work for 1000 hours every year, the transmission fluid shall be replaced one time.

Specific see "Instructions of 4WG200 Power Shift Gearbox".

● **Firstly carry on the aforementioned examination items**

Oscillating frame of rear axle

Lubricate the two lubricating joints of the oscillating frame of the rear axle.



Hinge pin of hydraulic oil cylinder and tie bar

Lubricate 11 hinging joints of the working device (excluding two hinge pins of the dipper).

Steering cylinder's hinge pin

Lubricate 4 bearings of the left and right steering cylinders.

Articulated bearing of front and rear frames

Inject lubricant

Lubricate the upper and lower articulated bearings of the front and rear frames.

Air conditioning System

1. For the integral air conditioning system, do not dismantle it randomly so as to prevent the condensator from leakage. Examine it regularly; especially examine whether the pipe joints are loosened and whether the collecting screws are loosened. For any problem, the corresponding measures shall be taken.
2. Regularly examine the belt for proper tightness. Usually, after working for 100 hours, it shall be examined one time. Please see the “**Regulation of Belt**” in the chapter of “Air Conditioning” for details.
3. Regularly clean the dust on the surface of condenser. It may be cleaned with water or high-pressure air blower to prevent weakening the condensation effect. Usually, after working for 100 hours, it shall be cleaned one time. Spray rinsing with steam is not allowed.
4. While removing the system refrigerant, discharge it slowly to avoid randomly discharging of the antifreezing oil. Keep it away from skin.
5. While replacing the parts, add the antifreezing oil according to the requirements.
6. The expansion valve has been adjusted well according to the relevant regulations. Do not adjust it without authorization.

9.6 Maintenance of Each 250 Working Hours or Every Month

Prior to carrying out any operation or maintenance, the warnings and annotations in this manual’s safety chapter shall be read and understood.

- **Firstly carry on the aforementioned examination items**

Engine oil and filter

Replace engine oil and filter

1. Disassemble the oil drain plug of crankcase, discharge oil, clean the plug and install it.
2. Open the machine’s left maintenance door, disassemble the filter with a zonary wrench.
3. Clean the filter’s shell base, remove all old filter gaskets.
4. Smear new filter gasket with a thin layer of engine lubricant.
5. Install new filter by hand, tighten it for semi-circle when the gasket touch the base.

6. Disassemble the oil filling cap, and add fresh oil into the crankcase. See also “Viscosity and Full Capacity of Operation Oil”. Clean the oil filling cap and install it.
7. Start the engine to heat oil, detect leakage, and shutdown the engine.
8. Maintain the engine oil in the normal position of oil gauge.
9. Install the maintenance door.

Braking system

Test the braking capacity of the service brake.

There shall not have any people and obstacles around the machine.

Fixed link of the front and rear frames shall be packed up.

Test the brake on dry road.

The following tests are used to determine whether the service brake functions are normal or not, not to measure the maximum braking force. The vehicle braking force needed by the engine running at a certain speed is adapted with the setting value of the engine and the efficiency of the driving system, as well as the braking capacity of the brake.

When the machine begins moving, the revolving speed of the engine when braking, the service brake shall be compared with that of the engine as braking stopper is under the original test, and shall be a system wear symbol.

1. Start the engine, slightly raise the bucket, brake the service brake, and release the parking brake.
2. When braking the service brake, put forward the gearshift at the second gear.
3. Gradually increase the revolving speed of the engine to high speed idle, and the machine shall not move.

Warning

When the machine begins moving, immediately reduce the revolving speed and close up the parking brake.

4. Let the revolving speed of the engine drop to low speed idle, set the gearshift to stop short, close up the parking brake, put the bucket on the ground, and shutdown the engine.

Caution

If the machine still moves when tasting the service brake, please connect with related service station and allow serviceman to check the machine. If necessary, the service brake shall be repaired before reuse of the machine.

Test the braking capacity of the parking brake.

There shall not have any people and obstacles around the machine.

There shall not have any people and obstacles around the machine.

Fixed link of the front and rear frames shall be packed up.

Fixed link of the front and rear frames shall be packed up.

Carry on the test on dry cement road which slant angle is about 8 degree and the length of the slope is about 20 meters.

The following tests are used to determine whether the service brake functions are normal or not, not to measure the maximum braking force.

1. Start the engine, and raise the bucket to the transport position (40 centimeters above the ground).
2. Drive the machine to the center of the slope, tramp the service braking pedal to stop the machine (do not loosen the pedal at this time).
3. Set the gearshift to the stop short and close up the parking brake.
4. Loosen the service braking pedal (shall not turn off the engine), observe whether the machine moves down or not. At this point in time, if the machine doesn't move in five minutes, the parking brake is normal.

Warning

If the machine moves, immediately tramp the service braking pedal to stop the machine and quickly drive it off the slope.

Caution

If the machine still moves when testing the parking brake, please connect with related service station and allow serviceman to check the machine. If necessary, the parking brake shall be repaired or adjusted before re-use the machine.

Cooling system

Add coolant additive.

Caution

Do not add additive randomly before reading and understanding the content of the chapter “Cooling System Specification”.

The maintenance door of the radiator cap is located on the top of the aft closure of the machine.

1. Open the maintenance gate.
2. Slowly unscrew the radiator cap and release pressure.
3. Add 0.25L coolant.
4. Fit on the radiator cap and close the maintenance gate.

Splines of propeller shaft

Lubricant splines

1. Disassemble the fixed link of the front and rear frames and start the engine.
2. Turn the machine right or left to the limit position.
3. Put the bucket on the ground, close up the parking brake, and shutdown the engine.
4. Lubricate the hinged splines of propeller shaft.

Air-conditioning

Service test - adjusting belt

1. Start the engine and allow it run at high speed idle.
2. Set the temperature knob of the air-conditioning at the largest refrigeration position (anticlockwise at full) and the switch of air volume at high position.
3. Wait two minutes for the stability of the air-conditioning system.
4. Check the refrigerants of the system by the following methods: touch the low-voltage tube and high-voltage tube by hand. If there has any refrigerant in the system, the high-voltage tube shall be hotter than the low-voltage tube. If there has no refrigerant or few, the air-conditioning system will stop working.
5. Shut down the engine and check the compressor belt.
6. Check the work and adjust the compressor belt. The belt shall lop to 14~20mm under a power of 110 Newton.
7. Screw the adjustable nut till it gets the correct belt tension and tighten the nut to $150\pm20\text{N.m}$.
8. Re-examine the regulation of the belt.
9. Repeat the 1~3 steps.
10. If the refrigeration is poor, shut down the air-conditioning and the engine. Connect with the service station for the maintenance of the air-conditioning if necessary.

Additional Maintenance Contents for the First 200 Hours after Usage of New Loader Are Given below

Front Axle and Rear Axle

Check the cleanliness of the oil and replace it if it is dirty.

See the steps in “Front axle and rear axle” in the maintenance of 50 hours running-in of new loader”.

Working device and hydraulic steering system

Check the cleanliness of the oil and replace it if it is dirty.

To see the steps in “Working device and hydraulic steering system” in the maintenance of the running-in 50 hours of new loader”.

9.7 Maintenance of Each 500 Working Hours or Every Season

- **Firstly carry on the aforementioned examination items**
- **Firstly carry on the aforementioned items.**

Before carrying out any operation or maintenance, the warnings and annotations in this manual’s safety chapter shall be read and understood.

Crankcase scavenging valve of engine

Clean scavenging valve

Carry on cleanup according to the service manual of diesel engine.

Hydraulic system

Replace filter.

1. Disassemble the oil filling cap, and release the pressure inside the gasoline tank.
2. Loosen the fixed bolts of the filters.
3. Disassemble the lid and filter element.
4. Discard the filter element.
5. Check the O-Ring and it shall be replaced if necessary.
6. Install new filter element and lid, and tighten the fixed bolts of the lid.
7. Maintain the hydraulic oil level in the middle of the oil gauge, and if necessary, refuel it through the oil filling port.
8. Check the seal of the lid of oil filling port, replace the gasket if it is damaged, and install

the lid of oil filling port.

Fuel oil system

Clean and replace the filter.

Caution

Before the installation of filter, do not refuel. Impure fuel oil will cause the accelerated wear of the fuel oil system.

Clean the coarse filter element.

Carry on working according to the service manual of diesel engine and the following steps are for reference only.

1. Open the maintenance door by the side of the machine.
2. Loosen the holding bolt on the shell of the filter.
3. Discard the shell and filter.
4. Disassemble the filter element from the lag.
5. Clean the filter element and shell in clean, non-flammable solvent.
6. Dry the filter element by compressed air.
7. Clean the shell base of the filter.
8. Check the seal ring and replace it if it is damaged.
9. Install clean filter element.
10. Encase the filtering element and lag.
11. Re-tighten the bolts.

Replace the thin fuel oil filter

Carry on working according to the service manual of diesel engine and the following steps are for reference only.

1. Disassemble the filter and discard it as useless.
2. Clean the filter fixing base, and make sure that all the old seal rings have removed.
3. Smear clean diesel on the new filter seal ring.
4. Install new filter by hand and twist another three-quarters circle when the seal touch the base.
5. Start the diesel engine system (see below).

Start the fuel system.

If the engine fails to start or run smoothly after refueling the filter and oil pump body, the injection pump and pressure duct shall be started with refueling.

Each injection pump has an overflow one-way valve, which can not be opened by manual pump pressure. Refuel the injection pump and pipeline according to the following steps.

- **If loosen or tighten fuel line nut by only a wrench, the fuel injector may be irremediable defect by distortion. So clamp the injector by a wrench and loosen the nut by another wrench.**

1. Loosen spray bar at the engine junk head.
2. Set the acceleration control leer to low speed idle position.
3. Start the engine and stop it till the diesel flow out from all pipelines and no air bubbles.
4. Tighten the nut of fuel oil pipe with a torsional moment of $40\pm7\text{N.m}$, and chuck the injector with another wrench to prevent damage.
5. Start the diesel and check its leakage.
6. Close the maintenance door.

Start pump

Filter and pump body

1. Open the engine fuel system vent valve.
2. Loosen the priming pump plunger and press it up and down.
3. Close the pump and lock plunger when there is no bubble as the fuel oil flows out.
4. Close the vent valve.
5. Start the diesel and check its leakage.

Fuel tank lock and fuel strainer

Oil filling cap of the fuel tank locates in the back of the machine.

1. Disassemble the lid.
2. Replace the lid if the gasket is broken.
3. Take out primary strainer from the oil filling port.
4. Clean the primary strainer with clean, non-flammable solvent.
5. Fit on the primary strainer.
6. Fit on the oil filling cap of the fuel tank

Additional Maintenance Contents for the First 600 Hours after the Usage of New Loader Are Given Below

Differential gear and final transmission

Replace oil.

See oil replacement in “Front axle and rear axle” in the maintenance of 50 hours running-in of new loader”.

Working device and hydraulic steering system

Replace oil.

See the steps in ““Working device and hydraulic steering system’ in the maintenance of the running-in 50 hours of new loader”.

9.8 Maintenance of Each 1000 Working Hours or Every Half An Year

Before carrying out any operation or maintenance, the warnings and annotations in this manual’s safety chapter shall be read and understood.

- **Firstly carry on the aforementioned examination items**
- **Firstly, carry on the aforementioned items.**

Gearbox oil

Replace the gearbox oil.

Start the engine to hear the oil and the machine shall be set at a level position. Set down the bucket and exert downward pressure on it slightly.

Close the parking brake and shutdown the engine.

4. Disassemble the oil drain plug at the bottom shell of the gearbox to discharge the oil, clean and fit on the oil plug.
5. Disassemble the oil drain plug which locates below the torque-converter’s oil radiator at the backmost of the machine and discharge the oil. Clean and fit on the oil plug.
6. Replace filter.
7. Fill up oil with special volume into the torque-converter and fill to the high position of the oil gauge when the machine is offstate.
8. Start engine and pedal the service brake.

9. Under the idle speed, slowly manipulate the joystick of the gearbox, and recycle the oil so that oil torque-converter and pipeline may be full of oil. Check the oil level of the torque-converter which shall between the low and high level of the oil gauge.
10. Set the joystick of gearbox at stop short, shutdown the engine and park it well. Specific see “Instructions of 4WG200 Power Shift Gearbox”.

Gimbal of driving shaft

1. Fill lithium-based lubricant into the grease fitting of the gimbal of middle shaft.
2. Fill lithium-based lubricant into the grease fitting of the gimbal of forward shaft.
3. Fill lithium-based lubricant into the grease fitting of the gimbal of fork of rear driving shaft.
4. Fill lithium-based lubricant into the grease fitting of the gimbal of rear driving shaft.

Additional Maintenance Contents for the First 1500 Hours after Usage of New Loader Are Given below.

Differential gear and final transmission

Replace oil.

See oil replacement in “Front axle and rear axle’ in the maintenance of 50 hours running-in of new loader”.

Working device and hydraulic steering system

Replace oil.

See the steps in “Working device and hydraulic steering system’ in the maintenance of the running-in 50 hours of new loader”.

9.9 Maintenance of Each 2000 Working Hours or Every Year

Before carrying out any operation or maintenance, the warnings and annotations in this manual’s safety chapter shall be read and understood.

- **Firstly carry on the aforementioned examination items**
- **Firstly, carry on the aforementioned items.**

Oil in hydraulic tank

Replace oil.

Let the machine work for longer hours to heat the oil.

The machine shall be on level ground, set all working devices in the ground and exert downward pressure on them. Close the parking brake and shutdown the engine.

1. Disassemble the oil filling cap of the hydraulic tank.
2. Open the vent valve at the bottom of the hydraulic tank and discharge the oil.
3. Close the vent valve.
4. Replace the filter of hydraulic system. See “Hydraulic System” in “Maintenance of Each 500 Working Hours or Every Season”.
5. Disassemble the fuel strainer, clean it and install it.
6. Refuel to the hydraulic tank. See “Viscosity and Full Capacity of Oil”.
7. Check the gasket of the oil filling cap and replace the damaged gasket.
8. Fit on the oil filling cap.
9. Start the engine and run it for a few minutes.
10. Maintain the hydraulic oil level in the middle of the oil gauge, and if necessary, refuel it through the oil filling port.
11. Shut down the engine.

Differential gear and final transmission

Replace oil.

1. Disassemble the oil drain plug of front axle and rear axle, and discharge the oil.
2. Clean the oil drain plug and reinstall it.
3. Disassemble the oil drain plug of front axle and rear axle, refuel the axle through the oil filling port till bleeding. See figures and tables in “Viscosity and Full Capacity of Oil”.
4. Install the oil drain plug. Start the engine and let it work for a few minutes. Re-check the oil level and refuel to the specified position if necessary.
5. Install the oil drain plug.

Service brake system

Check the preliminary filling pressure of nitrogen gas of the accumulator.

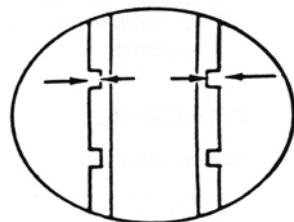
Please connect with the appointed maintenance service of the SICHUAN CHENGDU CHENGGONG CONSTRUCTION MACHINERY CO., LTD. to check the preliminary filling pressure of nitrogen gas of the accumulator for you.

Caution

Whether the preliminary filling pressure of nitrogen gas of the accumulator is too high or too low will reduce the service life of the accumulator, affect the braking performance, and danger the traffic safety by a lot of leakage.

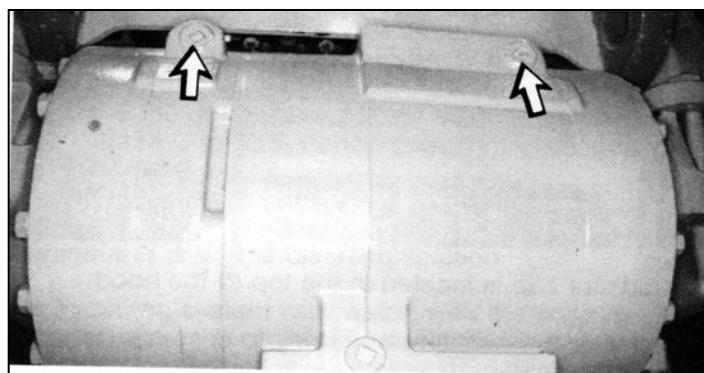
Check wear-out of wet brake disc.

1. Disassemble wear-out of front axle brake disc and check the plug screw.
2. Disassemble wear-out of rear axle brake disc and check the plug screw.
3. Measure the depth of the hollow form oil scupper on both sides of the brake disc, and gain the remaining time of the brake disc by compared with the following table.



Percentage of estimated remaining life of braking disc to the service life of braking disc	Thickness of braking disc mm	Depth of scupper mm
100	9.2	1.24
80	8.9	1.09
60	8.62	0.95
40	8.32	0.8
20	8.03	0.655
0	7.74	0.51

4. Fit on the plug screw.



If necessary to replace the braking disc, please connect with the dealers of the SICHUAN CHENGDU CHENGGONG CONSTRUCTION MACHINERY CO., LTD.

9.10 Maintenance of Each 2000 Working Hours or Every Year

Before carrying out any operation or maintenance, the warnings and annotations in this manual safety chapter shall be read and understood.

- **Firstly carry on the aforementioned examination items**
- **Firstly, carry on the aforementioned items.**

Coolant in the cooling system

Replace the coolant / clean the system.

Caution

Do not replace coolant before reading and understanding the content of the chapter “cooling system specification”.

Replace the coolant as soon as possible when observing the coolant has impurities or bubble.

The radiator cap locates at the top of the rear cover of the machine.

1. Open the maintenance gate of the radiator.
2. Slowly loosen the radiator cap and release the pressure.
3. Open the discharge valve and discharge the coolant. The discharge valve locates at the bottom of the radiator.
4. Close the discharge valve and add system clean water and cleaning liquid of the cooling system which concentration is 6%~10%.
5. Start the engine and run it for 1.5 hours, shutdown it and discharge cleaning liquid.
6. Shut down the engine and wash the cooling system with clean water till removes all water.
7. Close the discharge valve.
8. Add coolant. See also in “cooling system specification” and “Viscosity and Full Capacity of Oil”.
9. Start and run the engine, open the radiator cap, open the thermostat, stable the liquid level.
10. The coolant level shall keep within 1cm under the charging pipe.
11. Replace damaged lid gasket and fit on the lid.
12. Shut down the engine.

Machinery Management

I Management and Usage of New Machine

New machine leave factory after sophisticated inspection and test run. However, it shall have enough running-in before usage, which is the know-how of long-term maintaining machine in a well-state and economic usage.

Please take heed of the following items when using new machine:

- No matter what season, enough warming-up shall be done before working.
- Be sure to avoid the engine work in idling (non-load high-speed operation). It must not do like that especially not heating the engine.
- Be sure to avoid emergency brake, flashback and unnecessary spike stop.
- Inspection and maintenance shall be implemented by provisions.

II Storage of the Machine

The ambient temperature of storage is -15°C-40°C. If beyond this temperature range, it is suggested to store indoor. The relative humidity shall not exceed 70%.

2.1 No Use for One Month

In addition to the attention of stop at ordinary time, the following items shall be implemented for the machine of non-use of a month:

- Brake the machine for every week, and operate the working device to use at any time.

2.2 No Use for over One Month

In addition to the attention of stop at ordinary time, the following items shall be implemented for the machine of non-use of over a month:

- Check oil point of each part to see whether it has oil with specified volume.
- Park at hard-surface road at high position taking into account such as the rainy season.
- Take out the accumulator.

Even parking inside the house, the accumulator shall be kept in other dry place for the summer heat or humid area, and be charged for every month.

- Smear the anti-corrosive grease on the bare part of easily rusty hardware such as piston rod.
- Cover with clothes at the humidity area (venting device, air filter).

- Tyre pressure shall be adjusted to the standard pressure and check the abrasion and damage of tyre. (Prepare new tyre according to the check result).

In order to remove the burden of tyre load, float it by jacking up the machine.

If this approach can not be implemented, be sure to check the air pressure every two weeks to maintain proper air pressure.

- Carry on running the machine for every week, start the engine, move the machine forward after enough warming-up.

If the working device is moved, the antirust grease on the piston rod shall be wiped away firstly.

2.3 Use after Long-term Storage

- Remove the cover which prevents humidity.
- Wipe the anti-corrosive grease which covers the bare part.
- Discharge the oil in the engine crankcase, torque-converter gearbox, differential gear and final reducer, clean them, and replace new oil with specified volume.
- Discharge impurity and water from hydraulic reservoir and diesel box.
- Add cooling water with specified volume.
- Install the removed storage accumulator after it has been charged and connect it with cable.
- Adjust the tyre pressure according to the authorized pressure of the road.
- Carry on the inspection before operating.

Carry on the warm up operation.

Structure and specification are subject to any changes without notice

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